

1998-2004 ENGINE PERFORMANCE

Diesel Fuel Injection, 1.9L ALH - New Beetle

DIESEL FUEL INJECTION

DIESEL DIRECT FUEL INJECTION SYSTEM, SERVICING

The Diesel direct injection system Engine Control Module (ECM) is equipped with a Diagnostic Trouble Code (DTC) memory. Before starting repairs, adjustments and troubleshooting, check DTC memory to see if there are any stored DTCs. See **DTC MEMORY, CHECKING** . Make sure that Function 03: Output Diagnostic Test Mode (DTM) has been performed. See **FUNCTION 03: OUTPUT DIAGNOSTIC TEST MODE, PERFORMING** .

NOTE: Some checking and adjustment procedures can cause DTCs to be stored in DTC memory. For this reason, always erase DTC memory after completing all checking and adjustment procedures. See **DTC MEMORY, ERASING** . See **READINESS CODE, SETTING** to Set the Readiness code.

Safety precautions

To prevent injuries to persons and/or damage to the Diesel direct fuel injection and glow plug system, observe the following:

- Switch OFF the ignition before connecting or disconnecting Diesel fuel injection or glow plug system wiring or test cables.
- If the engine requires cranking at starter speed, without starting, e.g. when checking compression, disconnect the N109 Fuel cut-off valve harness connector from the Diesel injection pump.
- Obtain the radio Anti-theft code from the customer BEFORE disconnecting the Battery Ground strap.
- Always make sure that the ignition is switched OFF before disconnecting and connecting the battery. Otherwise, the Diesel direct injection system Engine Control Module could be damaged.

Safety precautions during Test drives

WARNING: Secure Scan Tool to rear seat and operate from this position using a second technician.

- Always attach Test and measuring instruments to the rear seat and operate them using a second technician from this location.

If test and measuring instruments are operated from the front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat could receive serious injuries if the airbag is triggered.

Rules for cleanliness

When working on the fuel supply/injection system, pay careful attention to the following "6 rules":

- Thoroughly clean all unions and the adjacent areas before disconnecting.
- Place removed parts on a clean surface and cover over but do NOT use fluffy cloths (lint contamination)!
- Carefully cover opened components or seal over, if the repair cannot be carried out immediately.
- Only install clean components:

Only unpack replacement parts immediately prior to installation.

Do not use parts that have been stored loose e.g. in tool boxes.

- When the system is open:

Do not work with compressed air if it can be avoided.

Do not move the vehicle unless absolutely necessary.

- Make sure that no Diesel fuel runs onto the coolant hoses. Clean contaminated hoses immediately.
Always replace affected hoses.

Diesel injection system, component locations overview

Components A, B and C are not shown on the illustration.

A. Brake vacuum vent valve switch for cruise control/diesel fuel injection -F47- and Brake light switch -F63-

- Together in one housing in footwell on brake pedal

B. Throttle Position (TP) Sensor - G79-

- in footwell on throttle pedal

See **THROTTLE POSITION SENSOR, CHECKING** .

- In case of malfunction it is displayed as Throttle Position sensor -G69-

C. Clutch vacuum vent valve switch -F36-

- in footwell on clutch pedal

NOTE: The following list refers to **Fig. 1** .

1. **EGR valve**
2. **Change-over valve for intake manifold flap -N239-**
3. **Needle Lift Sensor -G80-**
4. **EGR vacuum regulator solenoid valve -N18-**
5. **Diesel Direct Fuel Injection (DFI) Engine Control Module (ECM) -J248-**

- with Barometric Pressure (BARO) sensor -F96-
 - tighten nut for ground wire (located forward of ECM) to 9 +/- 1 Nm (80 +/- 9 in. lb)
6. **Wastegate bypass regulator valve -N75-**
 7. **Mass Air Flow (MAF) Sensor -G70-**
 8. **Engine Coolant Temperature (ECT) Sensor -G62-**
 9. **Engine speed (RPM) sensor -G28-**
 10. **Harness connector**
 - for Needle lift sensor -G80-
 11. **Harness connector**
 - for Engine Speed sensor -G28-
 - for Cold Start injector -N108-
 12. **Harness connector**
 - for Fuel temperature sensor -G81-
 - for Quantity adjuster -N146-
 - for Modulating piston displacement sensor -G149-
 - for Fuel shut-off valve -N109-
 13. **Cold start injector -N108-**
 14. **Fuel shut-off valve -N109-**
 15. **Injection pump Quantity adjuster -N146-**
 - with Fuel temperature sensor
 - with Quantity adjuster -N146-
 - with Modulating piston displacement sensor -G149-
 16. **Manifold Absolute Pressure (MAP) sensor -G71- and Intake Air Temperature (IAT) sensor -G72-**

1CO035180 RADIO 0001

Coding 06401 WSC 01230

G03260130

Fig. 1: Identifying Diesel Injection System Component Locations (1.9L ALH)

Diesel injection pump, servicing

- Observe Rules of cleanliness. See **RULES FOR CLEANLINESS** .
- Removing and installing Diesel injection pump. See **DIESEL INJECTION PUMP, REMOVING AND INSTALLING** .
- Dynamically checking and adjusting Diesel injection pump. See **START OF INJECTION, DYNAMICALLY CHECKING AND ADJUSTING** .

NOTE: **The following list refers to Fig. 2 .**

1. **20 Nm (15 ft lb) + 1/4 turn (90 °) further**
 - Always replace
2. **Injection pump sprocket**
 - Removing. See **DIESEL INJECTION PUMP, REMOVING AND INSTALLING** .
3. **Nut**
 - for hub

CAUTION: Do not loosen nut or basic setting of pump may change. This cannot be reset using normal workshop equipment.

4. **Union**
 - 25 Nm (18 ft lb)
 - for supply line
 - from fuel filter
5. **Diesel injection pump**
 - with Quantity adjuster (metering)
 - with Quantity adjuster -N146-
 - with Modulating piston displacement sensor -G149-
 - with Fuel temperature sensor
6. **Fuel shut off valve**
 - 40 Nm (30 ft lb)
7. **Union**
 - for return line
8. **Return line**
 - to control valve/fuel filter
9. **25 Nm (18 ft lb)**
10. **Fuel injector lines**

- 25 Nm (18 ft lb)
 - Remove with 3035
 - Always remove fuel line cluster as an assembly
 - Do not bend, kink or alter shape

11. **Union**

- 45 Nm (33 ft lb)
- with pressure valve

12. **25 Nm (18 ft lb)**

13. **3rd cylinder Fuel injector**

- includes Needle lift sensor -G80-
- Removing and installing. See **FUEL INJECTORS, REMOVING AND INSTALLING** .
- Servicing. See **FUEL INJECTORS, SERVICING** .

14. **20 Nm (15 ft lb)**

15. **Retainer**

16. **Mounting**

17. **Heat shield**

- Always replace

18. **10 Nm (7 ft lb)**

19. **Cold Start injector -N108-**

- Checking. See **FUNCTION 03: OUTPUT DIAGNOSTIC TEST MODE, PERFORMING** .

20. **Strainer**

21. **O-ring**

- Always replace

22. **25 Nm (18 ft lb)**

23. **Timing cover**

- Replace O-ring if leaking. See **DIESEL INJECTION PUMP TIMING COVER O-RING, REPLACING** .

24. **Sleeve**

- with nut

25. **Assembly bracket**

- Removing and installing. See **ENGINE, DISASSEMBLING AND ASSEMBLING** .

26. **25 Nm (18 ft lb)**

DIAG

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Fig. 2: Identifying Diesel Injection Pump Components (1.9L ALH)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Intake manifold change-over valve, servicing

The intake manifold change-over flap is closed for approx. 3 seconds when engine stops and then opens again which reduces the stop jolt.

Intake manifold change-over valve, checking. See **CHANGE-OVER VALVE FOR INTAKE MANIFOLD FLAP -N239-, CHECKING** .

NOTE: The following list refers to **Fig. 3** .

1. **Intake manifold**
2. **10 Nm (7 ft lb)**
3. **O-ring**
 - Always replace
4. **Connecting flange**
 - with EGR valve and change-over flap
5. **10 Nm (7 ft lb)**
6. **Gasket**
 - Always replace
7. **Connecting line**
 - to exhaust manifold
8. **25 Nm (18 ft lb)**

9. **Vacuum control element**
10. **Intake Manifold Flap Change-over valve -N239-**
 - Checking. See CHANGE-OVER VALVE FOR INTAKE MANIFOLD FLAP -N239-, CHECKING .
11. **Vacuum supply**
 - from vacuum pump

Control module does not answer HELP G03260132

Fig. 3: Identifying Intake Manifold Change-Over Valve Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Diesel injection pump, removing and installing

Special tools

- 3098 Lever camber adjustment
- V159 Pin wrench
- 3359 Rig pin
- VAG1318/10 Adapter
- 3418 Adjustment guide
- VAG1390 Hand vacuum pump

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Coding 06401 WSC 01230

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Fig. 4: Identifying Special Tools For Removing & Installing Diesel Injection Pump (1 Of 2)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Special tools, continued

- 2068A Adj. gauge TDC
- 3035 Injector line wrench
- VAG1331 Torque wrench 5 to 50 Nm (3.7 to 37 ft lb) or equivalent

Rapid data transfer

HELP

Select function XX

G03260134

Fig. 5: Identifying Special Tools For Removing & Installing Diesel Injection Pump (2 Of 2)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Diesel injection pump, removing

WARNING: Fire hazard! Do NOT have anything in the area that can ignite Diesel fuel.

- Unbolt all fuel lines at fuel pump.

NOTE: **Use 3035 tubing wrench to loosen the high pressure fuel lines.**

- Cover openings with a clean cloth.
- Remove connecting line between charge air cooler and intake manifold.
- Remove upper toothed belt guard and valve cover.
- Remove vacuum pump for brake servo.
- Turn crankshaft to cyl. 1 TDC (arrow).

Rapid data transfer

HELP

Select function XX

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Fig. 6: Turning Crankshaft To Cyl. 1 TDC (Manual Transmission)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Turn crankshaft to cyl. 1 TDC (arrow)

Rapid data transfer

HELP

Select function XX

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Fig. 7: Turning Crankshaft To Cyl. 1 TDC (Automatic Transmission)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- for Automatic transmission

With engine removed

Vehicles with manual transmission

- Install 2068 A TDC gauge as shown.
- Set adjustment device to 96 mm (arrow -A-).
 - Left-hand notch of the vernier scale is the reference point.
- Turn crankshaft until flywheel TDC marking aligns with point of setting device (arrow -B-).

Rapid data transfer

Q

02 - Check DTC Memory

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Fig. 8: Setting Adjustment Device & Turning Crankshaft Until Flywheel TDC Marking Aligns With Setting Device (Manual Transmission)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with automatic transmission

- Install 2068 A TDC gauge as shown.
- Set adjustment device to 30 mm (arrow -A-).
 - Left-hand notch of the vernier scale is the reference point.
- Turn crankshaft until TDC marking on drive plate aligns with point of setting device (arrow -B-).

X DTC recognized



G03260138

Fig. 9: Setting Adjustment Device & Turning Crankshaft Until Flywheel TDC Marking Aligns With Setting Device (Automatic Transmission)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

All vehicles

- Lock camshaft with setting bar.

No DTC recognized



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Fig. 10: Locking Camshaft With Setting Bar 3418

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Centralize setting bar as follows:

Turn camshaft so that one end of setting bar contacts the cylinder head. Using feeler gauge, establish the gap at the other end of the setting bar. Place a feeler gauge corresponding to half the gap between setting bar and cylinder head. Turn camshaft until the setting bar contacts the feeler gauge. Place a 2nd feeler gauge, of same thickness, at the other end between the setting bar and cylinder head.

- Remove injection pump sprocket mounting bolts -1-.

Rapid data transfer

HELP

Select function XX

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Fig. 11: Removing Injection Pump Sprocket Mounting Bolts & Hub Nut
Courtesy of VOLKSWAGEN OF AMERICA, INC.

CAUTION: Do not loosen hub nut -2- for ANY reason. Otherwise, the Diesel injection pump basic setting will be altered and cannot be reset with normal workshop equipment.

- Remove tensioning roller nut.
- Relieve tooth belt tension then remove camshaft and injection pump sprockets.
- Disconnect Quantity adjuster harness connector and unclip connector from retainer.
- Remove mounting bolts from assembly bracket -1-.

Rapid data transfer

HELP

Select function XX

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Fig. 12: Removing Mounting Bolts From Assembly Bracket
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove bolt from rear support (arrow).

Rapid data transfer

Q

03 - Output Diagnostic Test Mode

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Fig. 13: Removing Bolt From Rear Support
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove Diesel injection pump.

Diesel injection pump, installing

- Insert injection pump into assembly bracket then tighten mounting bolt on rear support with conical nut first.
- Insert front mounting bolts.
- tighten to 25 Nm (18 ft lb)
- Install new bolts (arrows) to mount injection pump sprocket to hub but do not tighten.

Output Diagnostic Test Mode



Loudspeaker

G03260143

Fig. 14: Installing New Bolts To Mount Injection Pump Sprocket To Hub
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Align injection pump sprocket to central position in elongated holes.

- Lock injection pump sprocket using 3359 pin.
- Loosen camshaft sprocket mounting bolt a half turn.
- Place a drift through hole in rear of toothed belt guard and release camshaft sprocket from camshaft taper with blow from hammer.

Output Diagnostic Test Mode



Output Radio Display Dash Panel Insert

G03260144

Fig. 15: Placing Drift Through Hole In Rear Of Toothed Belt Guard & Releasing Camshaft Sprocket Using Hammer

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove camshaft sprocket.
- Check whether TDC mark on flywheel and reference mark are aligned.
- Place tooth belt on injection pump sprocket and tensioning roller.
- Install camshaft sprocket into toothed belt and secure sprocket such that the camshaft can still turn.
- Tension toothed belt using pin wrench (e.g. Matra V159) on eccentric and turning clockwise until notch and raised mark align (arrows).

Output Diagnostic Test Mode



END

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Fig. 16: Tensioning Toothed Belt Using Pin Wrench & Aligning Notch & Raised Mark

Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Make sure retaining hook is correctly seated in toothed belt guard.

Rapid data transfer

HELP

Select function XX

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Fig. 17: Ensuring Retaining Hook Is Correctly Seated In Toothed Belt Guard
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Tighten mounting nut.
 - 20 Nm (15 ft lb)
- Check TDC mark on flywheel again.
- Tighten new mounting bolts for injection pump sprocket.
 - 20 Nm (15 ft lb)

NOTE:

- After dynamically checking the injection timing, tighten the bolts an additional 1/4 turn (90 °).
- The mounting bolts (stretch design) may only be used once.

- Tighten camshaft sprocket mounting bolt.
 - 45 Nm (33 ft lb)
- Remove 3359 locking pin.
- Remove 3418 setting bar from camshaft.
- Turn crankshaft two rotations in direction of engine rotation until crankshaft is set to cyl. 1 TDC again.
- Reconnect injection lines, fuel supply line and electrical wiring.

Fill injection pump with Diesel fuel as follows.

- Screw 1318/10 adapter into injection pump return/supply opening.
- Connect VAG1390 hand vacuum pump to adapter using approx. 40 inches of transparent plastic hose.

Rapid data transfer

Q

06 - End Output

G03260147

Fig. 18: Connecting VAG1390 Hand Vacuum Pump To Injection Pump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate vacuum pump until fuel flows out of return/supply opening.
 - Do not draw fuel into vacuum pump.
- Remove adapter and connect return/supply line.
- Install valve cover and vacuum pump.
- Dynamically check Start of injection and adjust if necessary. See **START OF INJECTION, DYNAMICALLY CHECKING AND ADJUSTING** .

Start of injection, dynamically checking and adjusting

Special tools

- VAG1331 Torque wrench 5 to 50 Nm (3.7 to 37 ft lb) or equivalent

Rapid data transfer

HELP

Insert address word XX

G03260148

Fig. 19: Identifying Special Tool VAG 1331
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- 3035 Injection line wrench

NOTE:

- **Dynamically checking and correcting Start of injection is only possible in Function 04, "Basic setting".**
- **Start of injection must always be checked after replacing the toothed belt or loosening the injection pump bolts or toothed belt sprockets and if necessary, adjusted.**

Checking and adjustment conditions

- Mechanical engine settings OK.
- Toothed belt tension OK.

Work sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only)

Rapid data transfer

HELP

Select function XX

G03260149

Fig. 20: Scan Tool Display - Start Of Injection (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown

Rapid data transfer

Q

05 - Erase DTC Memory

G03260150

Fig. 21: Scan Tool Display - Start Of Injection (2 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -4- buttons to select Function 04: "Basic setting"
- Press -Q- button to enter input.

Display will appear as shown

Rapid data transfer



DTC Memory is erased

G03260151

Fig. 22: Scan Tool Display - Start Of Injection (3 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0-, -0-, -0- button to select "Display group 0".
- Press -Q- button to enter input.

Display will appear as shown (1 to 10 = Display zones)

Rapid data transfer

HELP

Select function XX

G03260152

Fig. 23: Scan Tool Display - Start Of Injection (4 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check Engine Coolant Temperature in Display zone 7.
- Specification: less than 73 (equates to 85 °C)

Continue check only when Engine Coolant Temperature is obtained:.

Start of injection (in Display zone 2) is dependent on the Fuel temperature in Display zone 9.

- A. Display zone 2 Start of injection
- B. Display zone 9 Fuel temperature
- C. Specified range for Start of injection

Warning!

DTC Memory is not interrogated

G03260153

Fig. 24: Specification Range For Start Of Injection Graph
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Example:

Value 90 in Display zone 9 (B) corresponds to a numerical range from 35 to 74 in Display zone 2 (A).

NOTE: If, when checking Start of injection, the specifications are within zone -C-, no adjustment is required. After repairs, e.g. removing and installing injection pump or adjusting timing, Start of injection must be set to the mean value (dashed line) in zone -C-.

If Start of injection is outside specification, adjust as follows:

- Remove connecting line between charge air cooler and intake manifold.
- Remove upper toothed belt guard.
- Loosen two injection pump sprocket mounting bolts -1-.

Rapid data transfer



DTC Memory is not interrogated

G03260154

Fig. 25: Locating Injection Pump Sprocket Mounting Bolts & Hub Nut
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Place 22 mm box wrench onto hub nut -2- to counter-hold pump shaft. DO NOT loosen hub nut.
- Loosen 3rd injection pump sprocket mounting bolt and slightly turn pump shaft
- Left = advance Start of injection
- Right = retard Start of injection

CAUTION: Do not loosen hub nut -2- for ANY reason. Otherwise, the Diesel injection pump basic setting will be altered and cannot be reset with normal workshop equipment.

- Tighten new mounting bolts for injection pump sprocket.
 - 20 Nm (15 ft lb)

If injection pump has not previously been removed and installed

- Screw in new injection pump sprocket mounting bolts one after the other.
- Observe values in zone 2 and adjust again, if necessary, until the mean value for specification zone -C- is displayed.
- Tighten injection pump sprockets 1/ 4 turn (90 °) additional.
- Press --> button.

Display will appear as shown:

Rapid data transfer

Q

06 - End Output

G03260155

Fig. 26: Scan Tool Display - Start Of Injection (5 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.
- Erase DTC memory. See **DTC MEMORY, ERASING** . Set the readiness code. See **READINESS CODE, SETTING** .

Fuel injectors, removing and installing

Special tools

- VAG1331 Torque wrench (5 to 50 Nm) or equivalent

Rapid data transfer

HELP

Insert address word XX

G03260156

Fig. 27: Identifying VAG 1331 Torque Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- 3035 Injector line wrench

Code Control Module

Input code number XXXXX (0-32000)

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Fig. 28: Identifying 3035 Injector Line Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Faulty injectors can cause the following malfunctions:

- Misfiring
- Knocking in one or more cylinders
- Engine over-heating
- Loss of power
- Excessive black exhaust smoke
- Higher fuel consumption
- Excessive blue smoke when starting with cold engine

NOTE: Faulty injectors can be located by loosening the high pressure line connection on each injector in turn with the engine running at a fast idle. If engine speed remains constant after loosening a line connection, this would indicate a faulty injector.

Fuel Injectors, removing

- Remove injection lines using 3035 tubing wrench.

NOTE: Always remove fuel lines in a complete set. Do not alter line shape.

- Remove mounting nut, retainer and pull out fuel injector.

Fuel injectors, installing

NOTE: Always replace heat shield between cylinder head and fuel injectors.

- Insert fuel injector.
- Make sure mount is seated correctly in cylinder head and install retainer.

Tightening torques:

- Injection lines = 25 Nm (18 ft lb)
- Retainer screw = 20 Nm (15 ft lb)
- Erase DTC memory. See **DTC MEMORY, ERASING** . Set the readiness code. See **READINESS CODE, SETTING** .

Fuel injectors, servicing

The AHL engine is equipped with dual spring design injectors. Fuel is injected in 2 stages. These fuel injectors must be replaced if malfunctions occur because neither servicing nor pressure adjustment is possible.

Special tools

- VAG1322 Injector test stand with VAG1322/2 pressure line

Checking requirements

- Pressure gauge on

Fuel injection pressure, checking

WARNING: When testing fuel injectors, make sure that the stream of fuel does not contact your hands. The high pressure fuel delivery can penetrate skin

which could result in severe injuries.

- Connect fuel injector to fuel injector test stand.

Code Control Module

Q

Input code number 06401 (0-32000)

G03260158

Fig. 29: Connecting Fuel Injector To Fuel Injector Test Stand
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Move pump lever down slowly. When spray begins, record opening pressure for deviations from specification replace injector.
- Specification (new injectors): 220 - 230 bar
- Wear limit: 200 bar

Fuel injectors, leak-checking

- Pressure gauge on
- Move pump lever down slowly and maintain a pressure of approx. 150 bar for 10 seconds.
- No fuel should leak from the nozzle tip.
- If any injector(s) leak, replace.

Diesel injection pump timing cover O-ring, replacing

- Place a clean cloth under the Diesel injection pump.
- Remove cover screws -1- with commercially available tool for Torx socket head screws, e.g. Hazet 2115 -T30.
- Remove cover -2- and clean thoroughly.
- Replace O-ring -3- and install cover using existing shims -4-.

Rapid data transfer

HELP

Select function XX

G03260159

Fig. 30: Removing Injection Pump Timing Cover Assembly
Courtesy of VOLKSWAGEN OF AMERICA, INC.

DIESEL FUEL INJECTION COMPONENTS AND FUNCTIONS, CHECKING

WARNING: Make sure that no electronic components are destroyed during testing by observing the following:

- Switch the Fluke 83 multimeter to the appropriate units range before connecting measuring cables!
- Always observe checking requirements!

NOTE:

- Use the Fluke 83 multimeter and VAG1527B Voltage tester for electrical checking.
- Specifications are valid for an ambient temperature range from: 0 to + 40 ° C (+32 to 104 °F).
- If measured values deviate only slightly from the specifications, clean the sockets and plugs on the tester and measuring cables, then repeat check. Before replacing a component, check wiring and connections. In cases of specifications less than 10 ohm repeat the resistance measurement on the component.
- To connect a tester to the Test Box, use jumper wires from the VW 1594 adapter kit.
- The terminal numbers of the plugs and the socket numbers on the Test Box are identical.

Diesel injection system Voltage supply, checking

Special tools

- VAG1598/22 Test Box (MY 1999)

- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test requirements

- Battery Voltage OK.

Test sequence

- Switch OFF ignition.
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.

Code Control Module **Q**

Input code number 06031 (0-32000)

G03260160

Fig. 31: Connecting VAG1598/22 Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Bridge sockets with jumper wires from VW 1594 kit.
- Up to MY 1999: sockets 33 + 1
- From 2000: sockets 18 + 4
- Measure Voltage between following sockets:
 - Up to MY 1999: sockets 2 + 1, 28 + 1, 27 + 2 and 28 + 27
 - From 2000: sockets 1 + 4, 2 + 4, 1 + 5, 2 + 5
 - Specification: approx. battery Voltage

If specification not obtained:

- Check power supply relay -J31-, terminal 30.

- -J317- located on fuse relay panel above the central electric.
- Check wiring for open circuit, short circuit and transfer resistance at terminals using Wiring diagram.

If wiring and relay OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .

Engine speed (RPM) sensor -G28-, checking

Engine speed (RPM) sensor -G28- serves dual purpose of speed and reference mark sensor. An inoperative sensor will stop engine.

Special tools

- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Switch OFF ignition.
- Disconnect -G28- harness connector. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .
- Measure resistance between connector terminals 1 + 2.
 - Specification: 1000 to 1500 ohm

Rapid data transfer

HELP

Select function XX

G03260161

Fig. 32: Identifying Engine RPM Sensor Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If specification not obtained:

- Replace Engine Speed sensor -G28-.

See **ENGINE, DISASSEMBLING AND ASSEMBLING** .

- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If specification obtained:

- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.

Rapid data transfer

Q

06 - End Output

G03260162

Fig. 33: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and 3-pin harness connector using Wiring diagram.

Rapid data transfer

HELP

Insert address word XX

G03260163

Fig. 34: Identifying Engine RPM Sensor Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 1 + socket 69
- Terminal 2 + socket 67
- Terminal 3 + socket 71

From MY 2000

- Terminal 1 + socket 102
- Terminal 2 + socket 110
- Terminal 3 + socket 86
- Wire resistance: 1.5ohm maximum
- Check wiring for short circuit to one another at 3-pin harness connector using Wiring diagram.
- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Manifold Absolute Pressure (MAP) Sensor -G71- and Barometric Pressure (BARO) Sensor -F96-, checking

The BARO -F96- sensor is located in the Engine Control Module - Direct Injection System. The intake manifold pressure sensor is a separate component and is located in the pipe between the charge air cooler and intake manifold.

Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable

Test sequence

- Connect VAG1551/1552 Scan Tool. See VAG1551/1552 SCAN TOOL, CONNECTING .
- Switch ON ignition but do not start engine.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):

Rapid data transfer

HELP

Select function XX

G03260164

Fig. 35: Scan Tool Display - MAP Sensor & BARO Sensor (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

Q

08 - Read Measuring Value Block

G03260165

Fig. 36: Scan Tool Display - MAP Sensor & BARO Sensor (2 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

Read Measuring Value Block HELP

Input display group number XXX

G03260166

Fig. 37: Scan Tool Display - MAP Sensor & BARO Sensor (3 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0-, -1- and -0- buttons to select "Display group 10".

0 mg/H 1027 mbar 1013 mbar 0.0 %

Compare Display zone 2 (Barometric Pressure (BARO) Sensor -F96-) with Display zone 3 (Manifold Absolute Pressure (MAP) Sensor -G71-).

Read Measuring Value Block 1



1

2

3

4

G03260167

Fig. 38: Scan Tool Display - MAP Sensor & BARO Sensor (4 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Specification: pressures must be the same (+/-30 mbar)

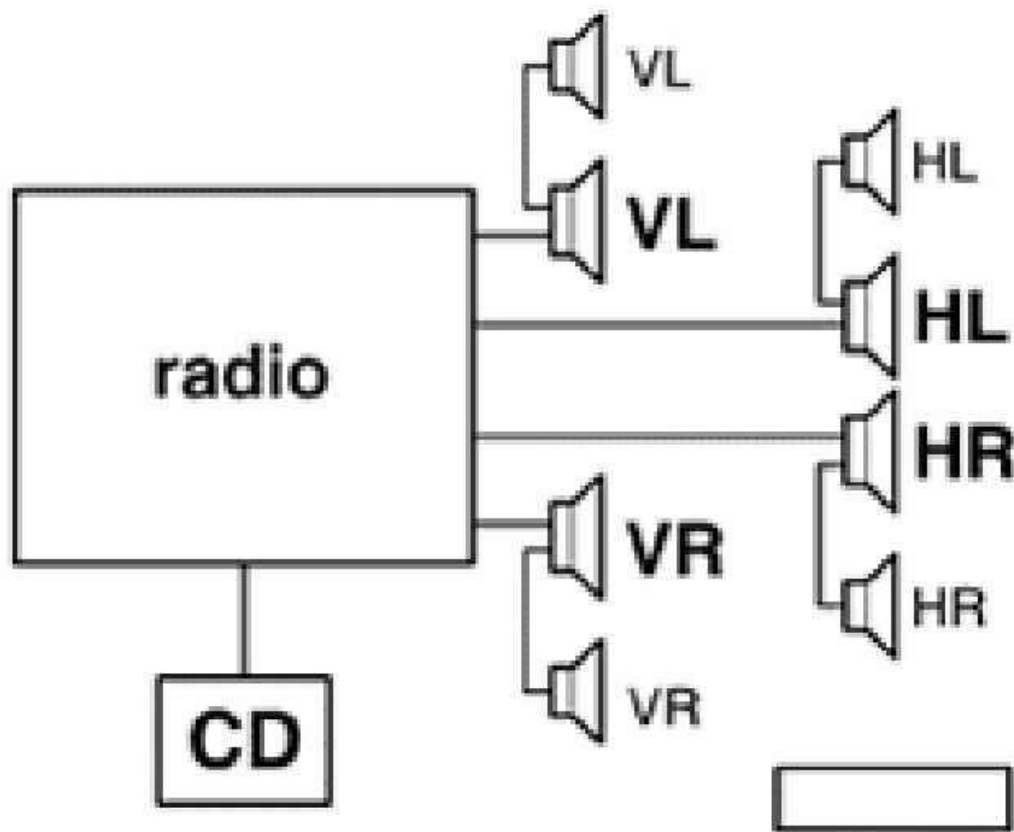
If value in Display zone 2 deviates:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .

If value in Display zone 3 deviates:

- Press --> button.

Display will appear as shown:



👉 **VL = Left front**

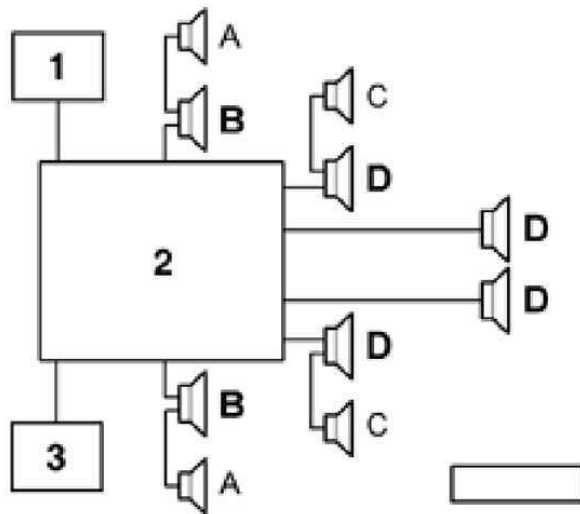
HL = Left rear

VR = Right front

HR = Right rear

Fig. 39: Scan Tool Display - MAP Sensor & BARO Sensor (5 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.
- Switch OFF ignition.
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



1 - Amplifier

2 - Radio Monsoon

3 - CD player

A - Domed treble loudspeaker in inner plenum chamber cover

B - Bass loudspeaker in inner plenum chamber cover

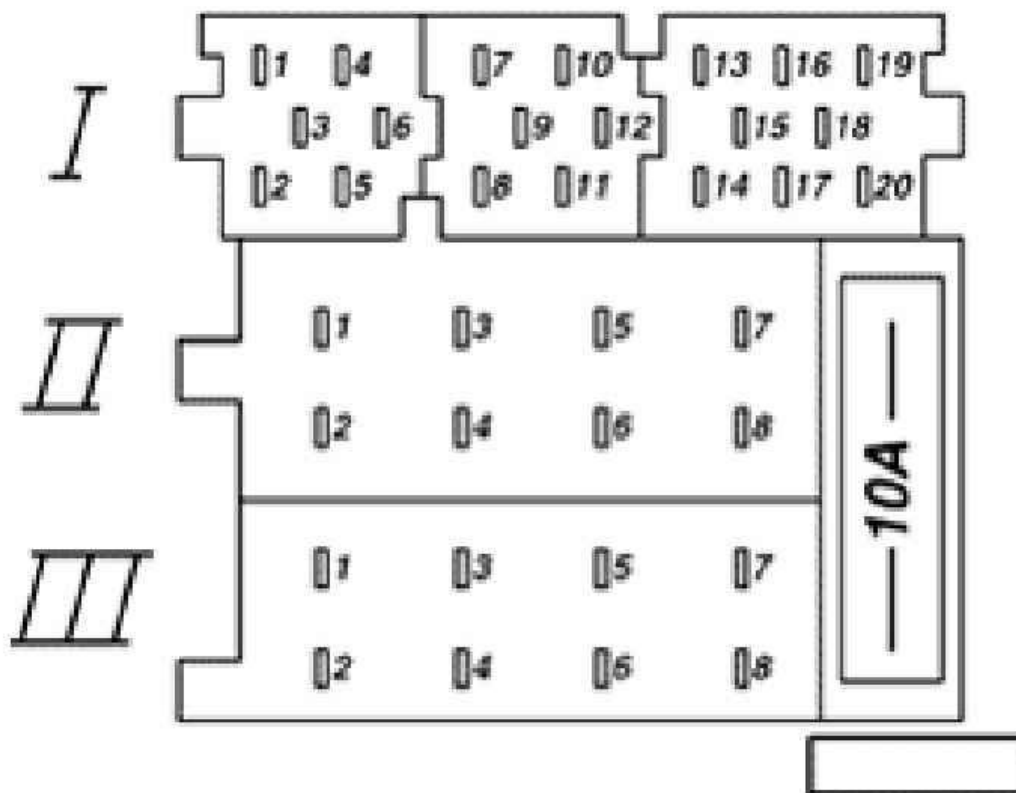
C - Domed treble loudspeaker in A-pillar trim

D - Bass loudspeaker, front and rear in side panel trim

G03260169

Fig. 40: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Disconnect -G71- harness connector. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .
- Check wiring for open circuit between Test Box and connector using Wiring diagram.



G03260170

Fig. 41: Identifying MAP And BARO Sensor Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 3 + socket 39
- Terminal 4 + socket 40

From MY 2000

- Terminal 3 + socket 31
- Terminal 4 + socket 71
- Wire resistance: 1.5ohm maximum
- Check wires for short to one another, to Ground and to Battery +

- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Engine Coolant Temperature (ECT) Sensor -G62-, checking

Special tools

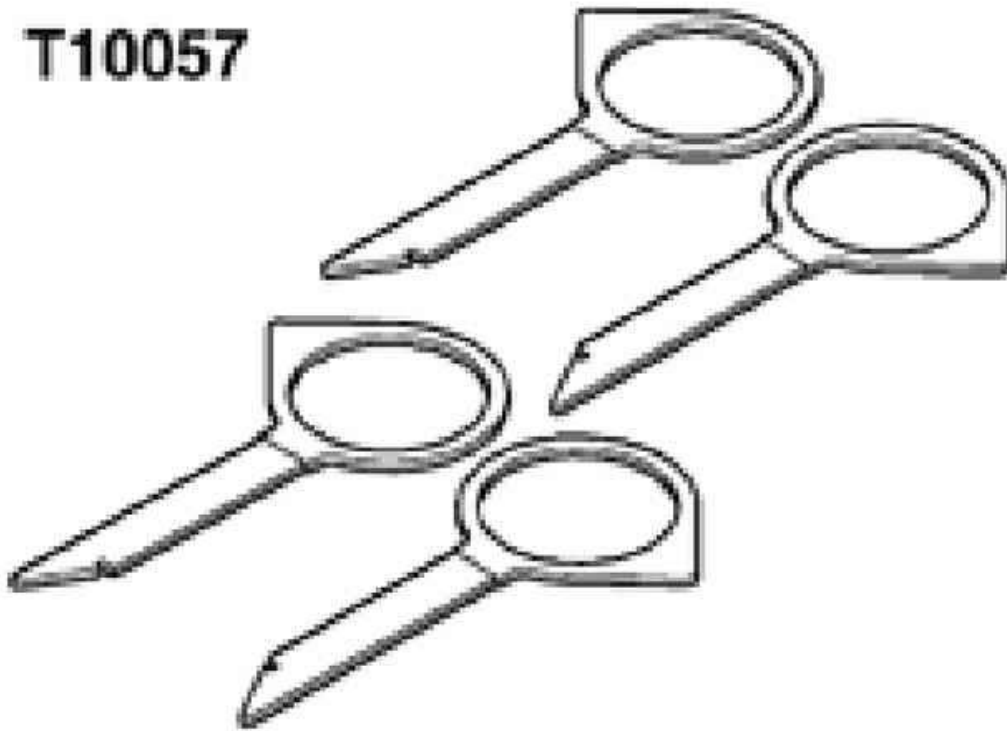
- VAG1551/1552 Scan Tool or vehicle system tester VAG1552 using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):

T10057

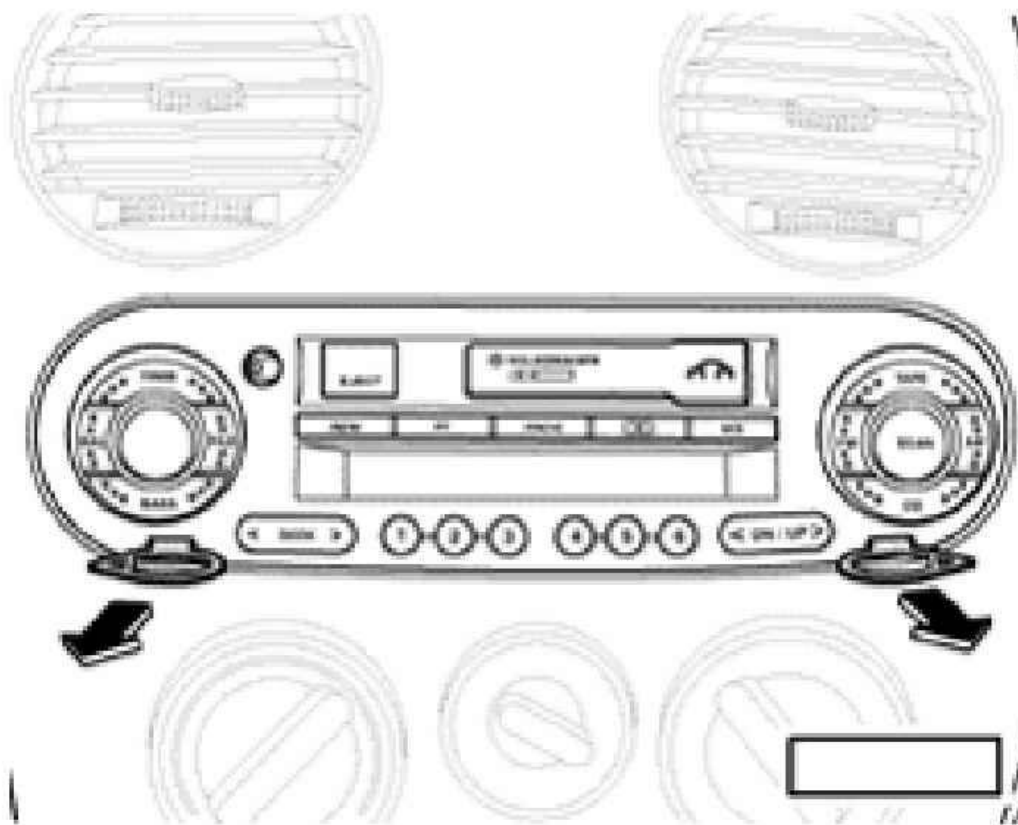


G03260171

Fig. 42: Scan Tool Display - Engine Coolant Temperature Sensor (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

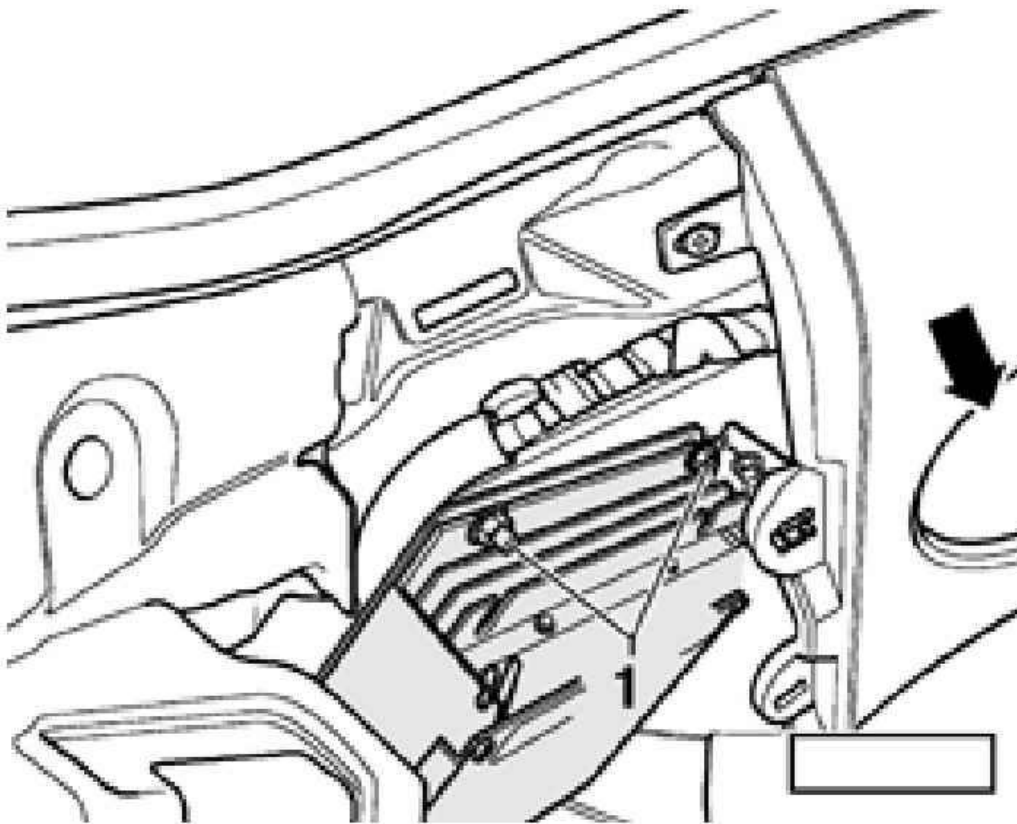


G03260172

Fig. 43: Scan Tool Display - Engine Coolant Temperature Sensor (2 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".

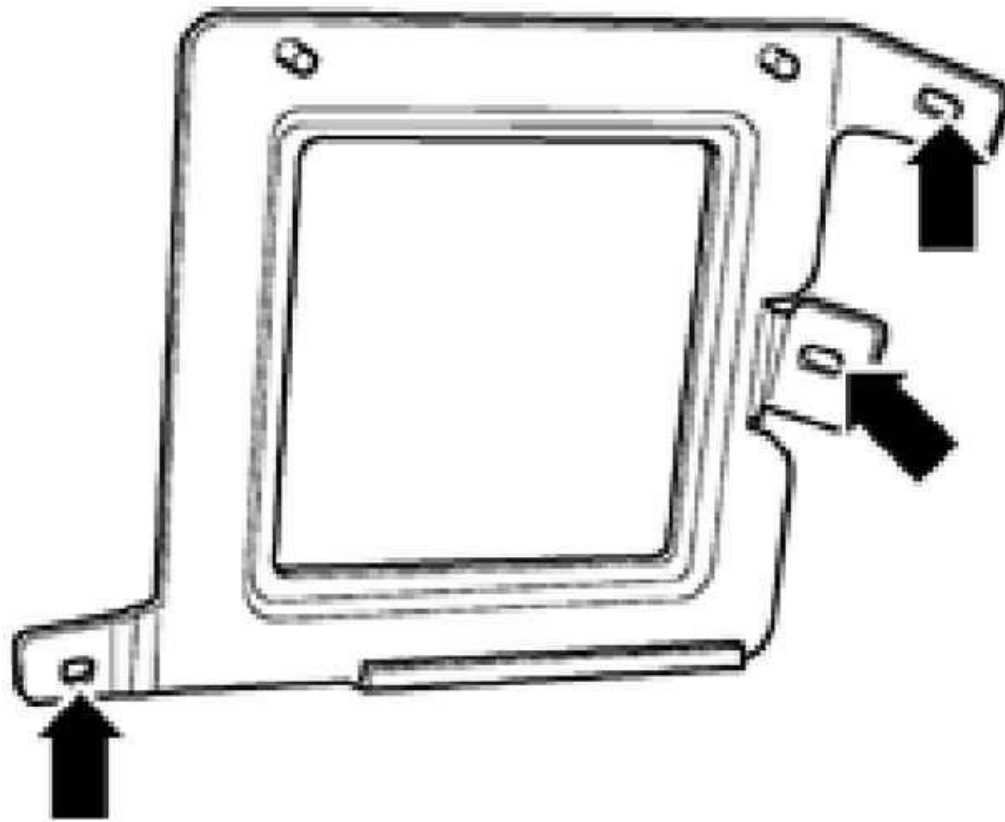
Display will appear as shown:



G03260173

Fig. 44: Scan Tool Display - Engine Coolant Temperature Sensor (3 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0-, -0- and -7- buttons to select "Display group 7".
- Display will appear as shown:



G03260174

Fig. 45: Scan Tool Display - Engine Coolant Temperature Sensor (4 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

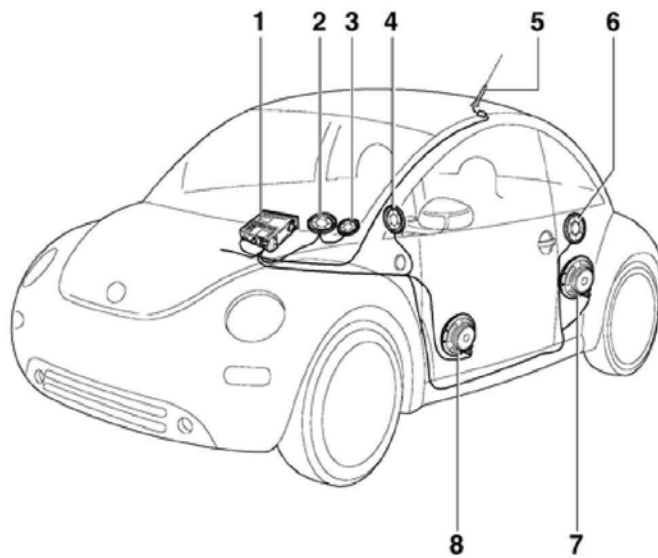
- Observe Engine Coolant Temperature value in Display zone 4.
- Temperature value must Increase uniformly without interruption.

NOTE: **In the event of malfunctions, Fuel temperature is displayed as a substitute.**

If an unrealistic value appears in Display zone 4 or Fuel temperature is displayed as a substitute

- Check Engine Coolant Temperature (ECT) Sensor -G62- and wiring to sensor as follows
- Press --> button.

Display will appear as shown:



1 - Radio

- ◆ In center console
- ◆ Removing and installing ⇒ [Page 91-10](#)

2 - Bass loudspeaker (with Monsoon only)

- ◆ In inner plenum under cover
- ◆ Removing ⇒ [Page 91-22](#)

3 - Domed treble loudspeaker (with Monsoon only)

- ◆ In inner plenum under cover
- ◆ Removing ⇒ [Page 91-22](#)

4 - Domed treble loudspeaker

- ◆ In A-pillar
- ◆ Removing ⇒ [Page 91-20](#)

5 - Roof antenna

- ◆ Amplified mast type antenna mounted on roof ⇒ [Page 91-29](#)

6 - Not applicable

7 - Bass loudspeaker

- ◆ In rear side panel
- ◆ Removing and installing ⇒ [Page 91-21](#)

8 - Bass loudspeaker

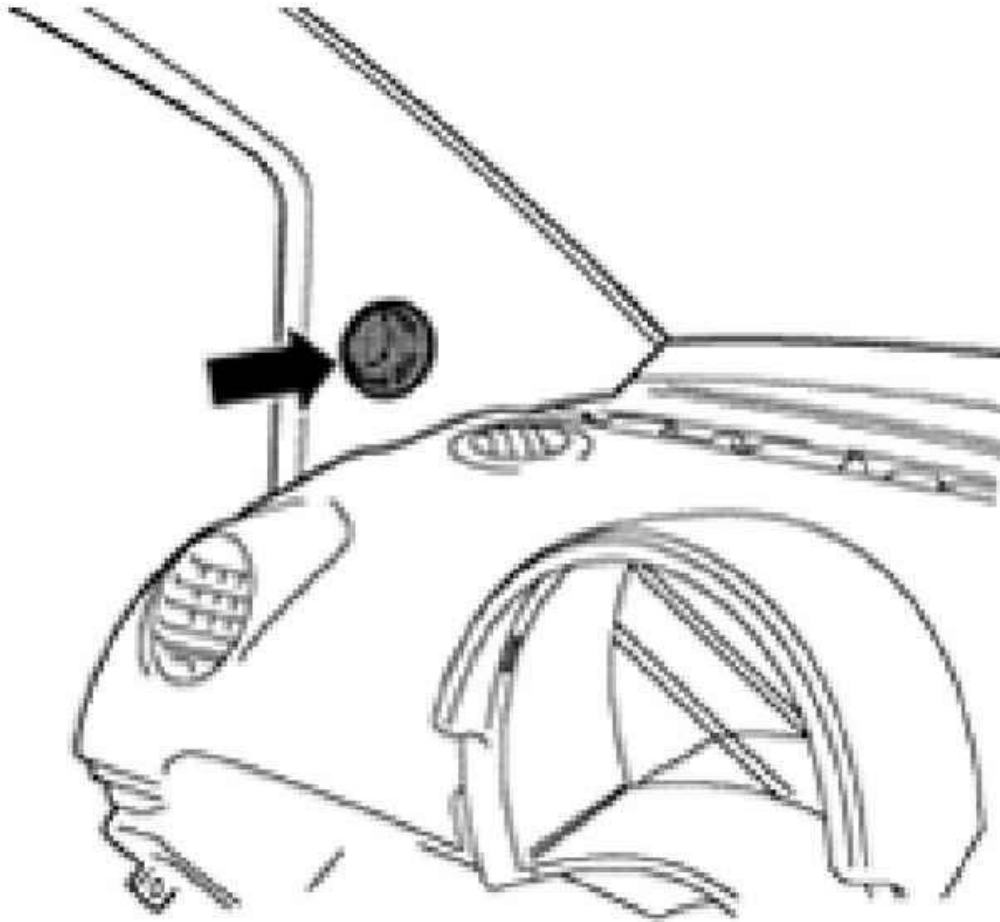
- ◆ In front door
- ◆ Removing and installing ⇒ [Page 91-21](#)

G03260175

Fig. 46: Scan Tool Display - Engine Coolant Temperature Sensor (5 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".

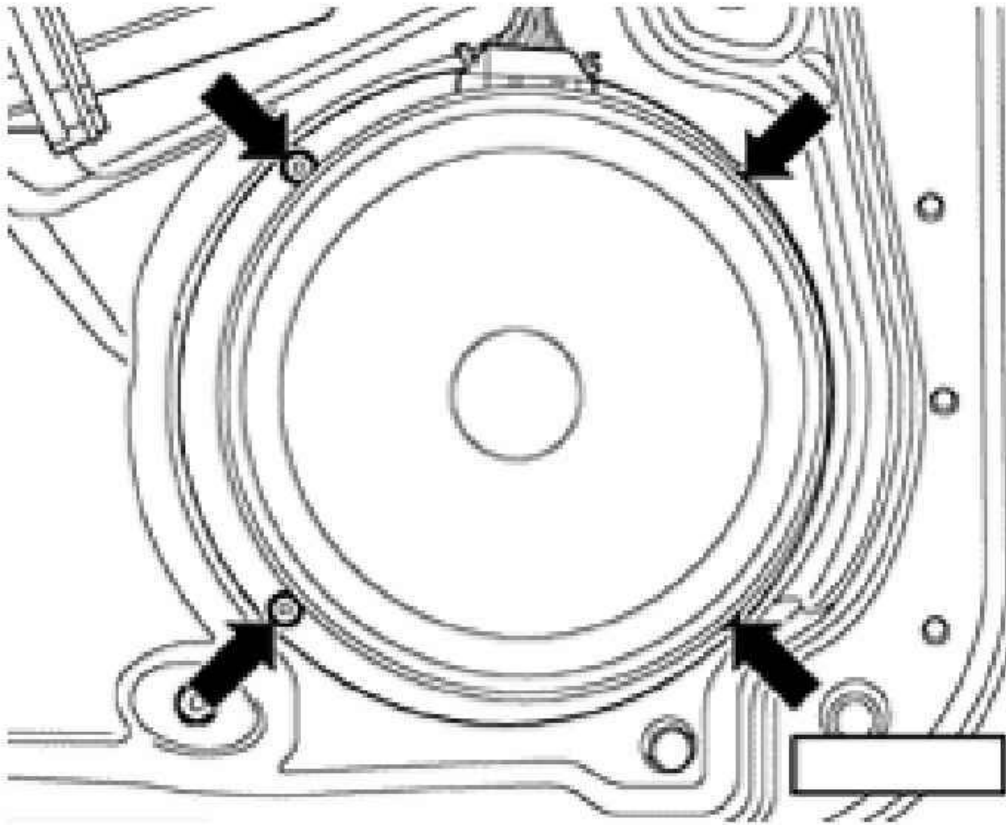
- Press -Q- button to enter input.
- Switch OFF ignition.
- Disconnect -G62- harness connector (arrow).



G03260176

Fig. 47: Disconnecting ECT Sensor -G62- Harness Connector
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Measure resistance between sensor terminals 1 + 3.

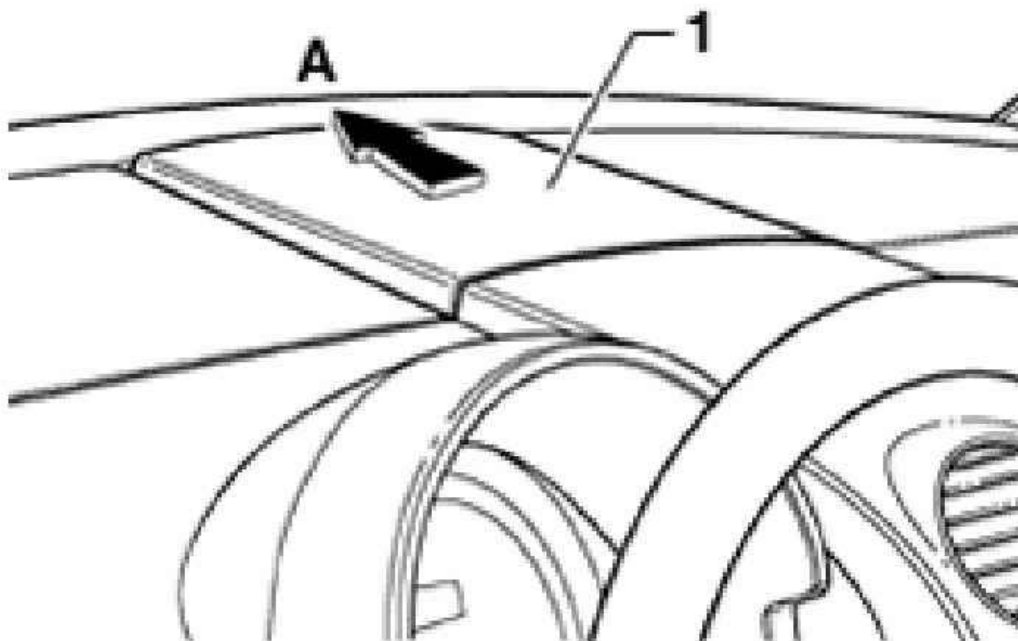


G03260177

Fig. 48: Identifying Resistance Between ECT Sensor Terminals 1 And 3
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Specification (see diagram):

Scale A shows resistance values for temperature range 0 to 50 °C and scale B the values for temperature range 50 to 100 °C.



G03260178

Fig. 49: ECT Sensor Resistance Versus Temperature Range Graph
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Examples:

- 30 °C corresponds to a resistance from 1500 to 2000 ohm
- 80 °C corresponds to a resistance from 275 to 375 ohm

If specification not obtained:

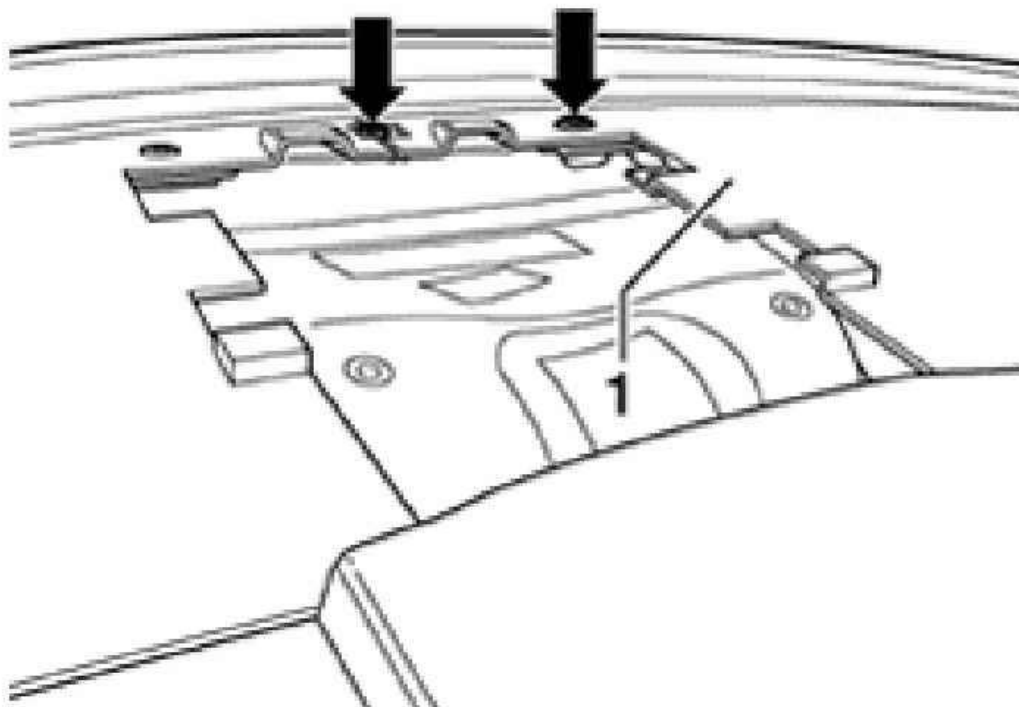
- Replace Engine Coolant Temperature (ECT) Sensor -G62-.
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If specification obtained:

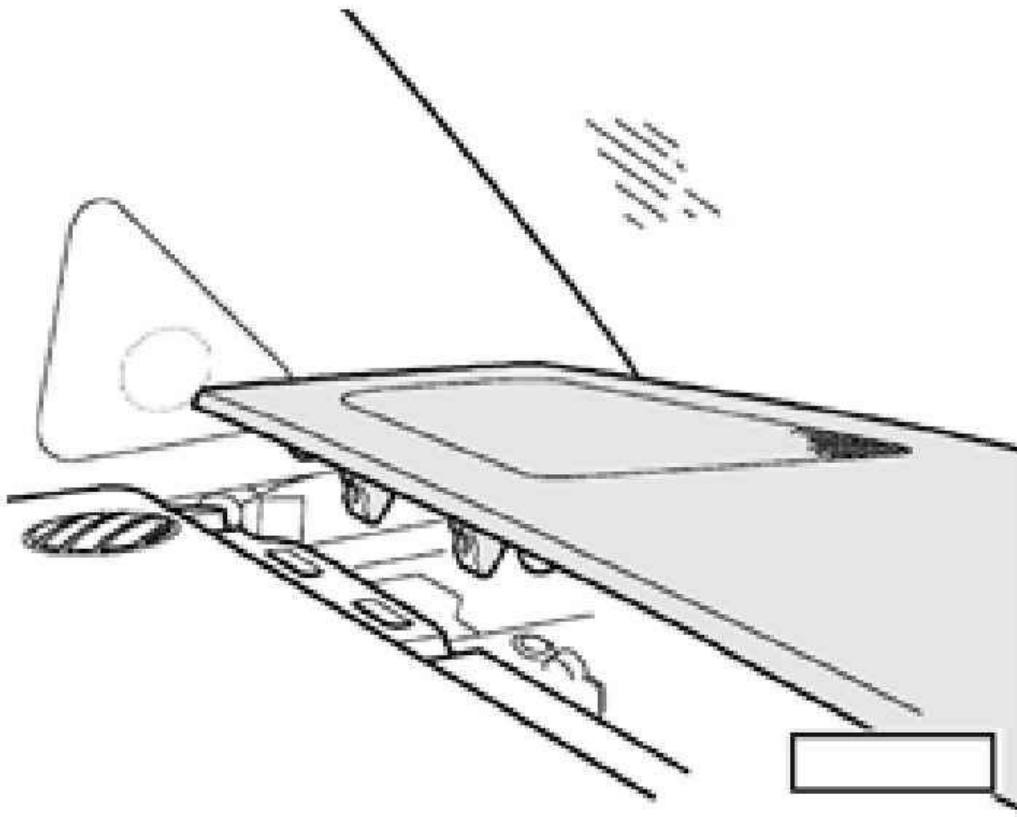
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03260179

Fig. 50: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and 4-pin harness connector using Wiring diagram.



G03260180

Fig. 51: Identifying ECT Sensor Harness Connector Terminals 1 And 3
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 1 + socket 70
- Terminal 3 + socket 54

From MY 2000

- Terminal 3 + socket 112
- Terminal 4 + socket 104
- Wire resistance: 1.5ohm maximum
- Check wires for shorting to: one another, Ground and Battery +

- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Erase DTC memory. See **DTC MEMORY, ERASING** . (Disconnecting the Engine Coolant Temperature sensor generates a DTC).

Brake Light Switch -F63- and Brake Vacuum Vent Valve Switch for Cruise Control/Diesel Fuel Injection -F47-, checking

The Diesel injection system senses throttle pedal travel via the Throttle Position Sensor -G79-. As with any mechanical device, -G79- could be faulty. For reasons of safety, engine speed is regulated when the brakes are applied. To accomplish this, the ECM requires signals from the Brake Light Switch -F- and the Brake Vacuum Vent Valve Switch -F47-. This means that if the brakes are applied while the throttle pedal is depressed, engine speed will immediately drop to an idle. An incorrectly adjusted switch could lead to unnecessary regulating action.

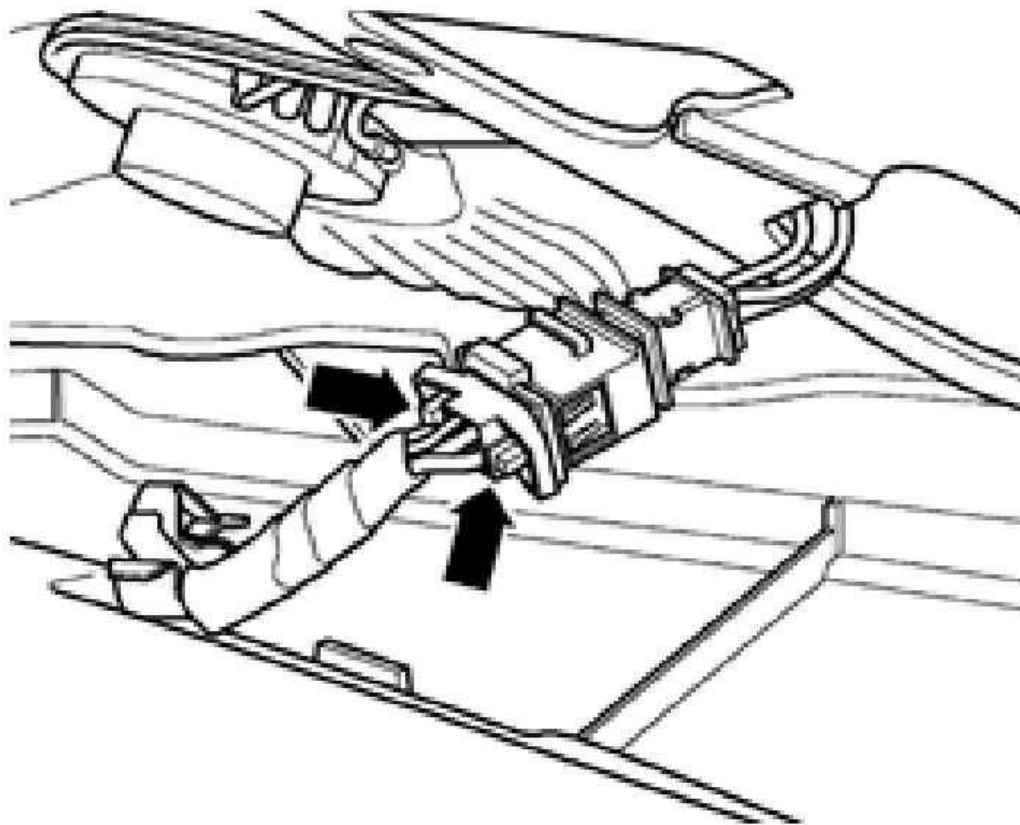
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Switch ON ignition but do not start engine.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):



G03260181

Fig. 52: Scan Tool Display - Brake Light Switch & Brake Vacuum Vent Valve Switch (1 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

Select function XX

G03450513

Fig. 53: Scan Tool Display - Brake Light Switch & Brake Vacuum Vent Valve Switch (2 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

Read measuring value block

HELP

Input Display group number XXX

G03450514

Fig. 54: Scan Tool Display - Brake Light Switch & Brake Vacuum Vent Valve Switch (3 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -0- and -6- to select "Display group 6".
- Press -Q- button to enter input.
- Observe values in Display zone 2.

Specification: 0 0 0

Read measuring value block 6

0 km/h 0 0 0 000000

255

G03450515

Fig. 55: Scan Tool Display - Brake Light Switch & Brake Vacuum Vent Valve Switch (4 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Slowly operate brake pedal.
- Specification: 0 1 1

Both displays must change from 0 to 1 at same time.

Read measuring value block 6

0 km/h 01 1 000000

255

G03450516

Fig. 56: Scan Tool Display - Brake Light Switch & Brake Vacuum Vent Valve Switch (5 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Center display = Brake Vacuum Vent Valve Switch -F47-
- Right-hand display = Brake Light Switch -F-
- Slowly release brake pedal to rest position again.

Both displays must change from 1 to 0 again.

Read measuring value block 6

0 km/h 00 0 000000

255

G03450517

Fig. 57: Scan Tool Display - Brake Light Switch & Brake Vacuum Vent Valve Switch (6 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If one or both displays do not change:

- Adjust switch point for -F47- by turning switch.
- Adjust switch point for -F- by moving plunger.
- Check switches or wiring to the switches:

See appropriate System Wiring Diagram article.

- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Clutch Vacuum Vent Valve Switch -F36-, checking

Clutch Vacuum Vent Valve Switch -F36- informs the ECM when the clutch is being engaged or disengaged. This prevents the engine from jerking when disengaging and engaging. It also prevents the engine from racing during disengagement operations when the Cruise Control System is switched ON.

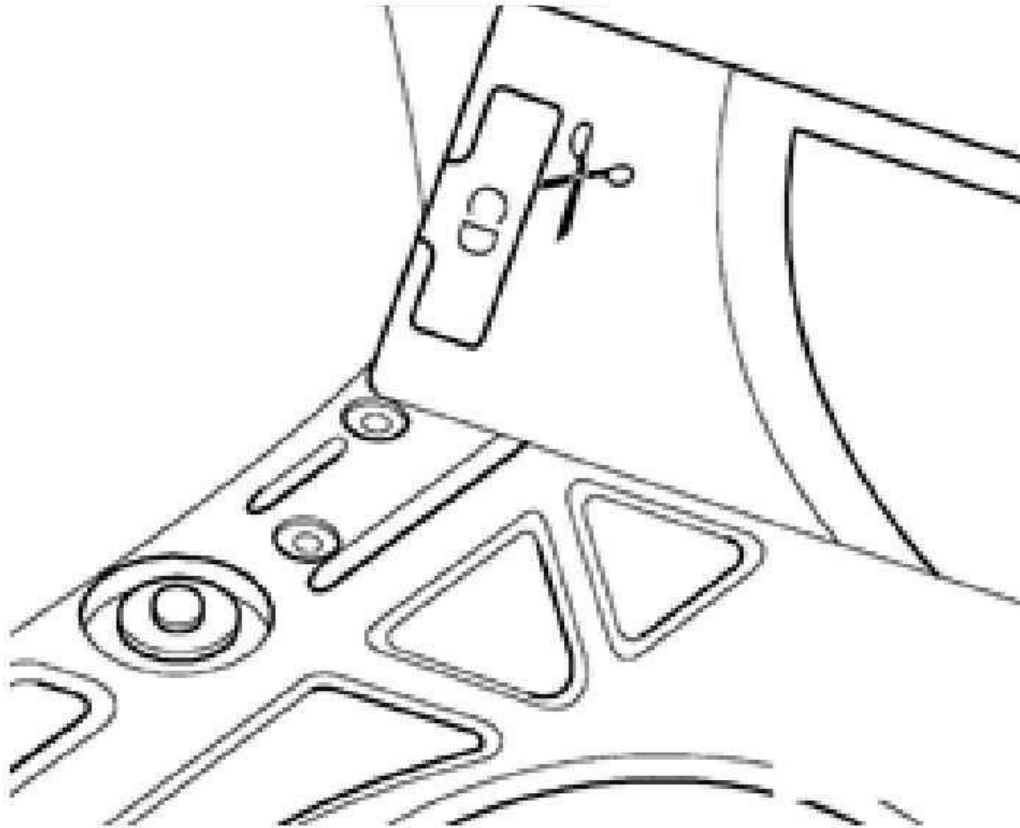
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Switch ON ignition but do not start engine.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):



G03260187

Fig. 58: Scan Tool Display - Clutch Vacuum Vent Valve Switch (1 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

Select function XX

G03450519

Fig. 59: Scan Tool Display - Clutch Vacuum Vent Valve Switch (2 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

Read measuring value block

HELP

Input Display group number XXX

G03450520

Fig. 60: Scan Tool Display - Clutch Vacuum Vent Valve Switch (3 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -0- and -6- to select "Display group 6".
- Observe value in Display zone 2.

Specification: 0 0 0

Read measuring value block 6

0 km/h 0 0 0000000

255

G03450521

Fig. 61: Scan Tool Display - Clutch Vacuum Vent Valve Switch (4 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Operate clutch pedal.
- Left-hand position value must change to 1.

Specification: 1 0 0

Read measuring value block 6

0 km/h 1 0 0 000000

255

G03450522

Fig. 62: Scan Tool Display - Clutch Vacuum Vent Valve Switch (5 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If specifications not obtained:

- Press --> button.

Display will appear as shown:

Rapid data transfer

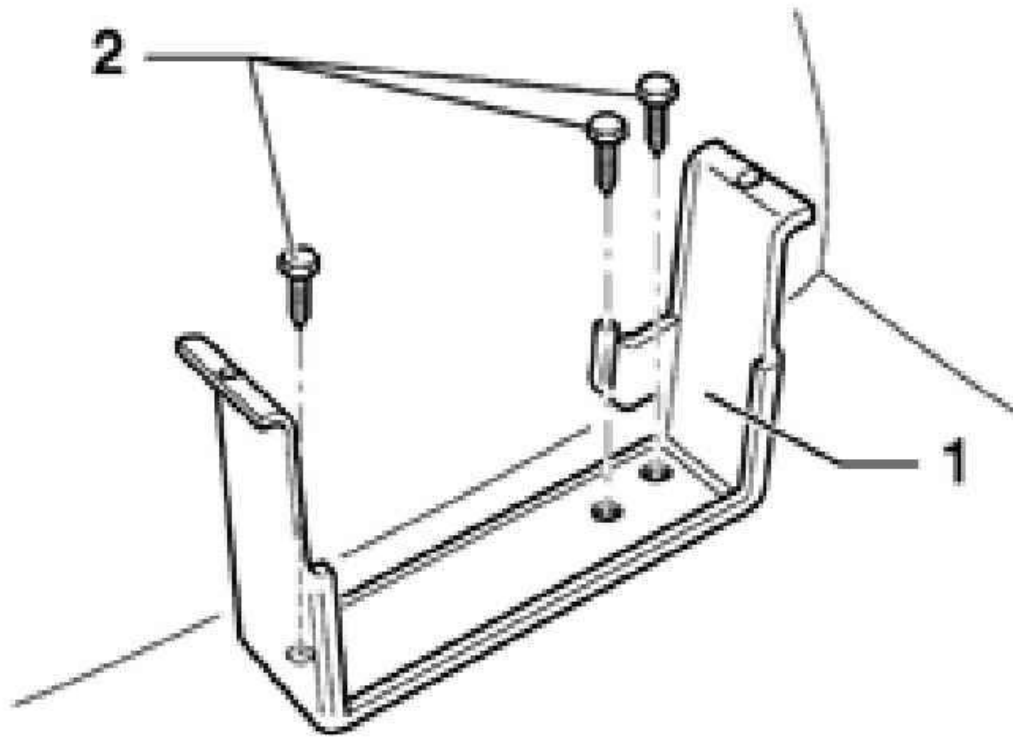
HELP

Select function XX

G03450523

Fig. 63: Scan Tool Display - Clutch Vacuum Vent Valve Switch (6 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.
- Switch OFF ignition.
- Disconnect Clutch Vacuum Vent Valve Switch -F36- harness connector. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .
- Switch Fluke 83 multimeter to resistance range.
- Measure resistance at switch terminals.



G03260193

Fig. 64: Measuring Resistance At Clutch Vacuum Vent Valve Switch Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Specification:
 - Clutch not depressed: maximum 10 ohm
 - Clutch depressed: INFINITY ohm

If specifications not obtained:

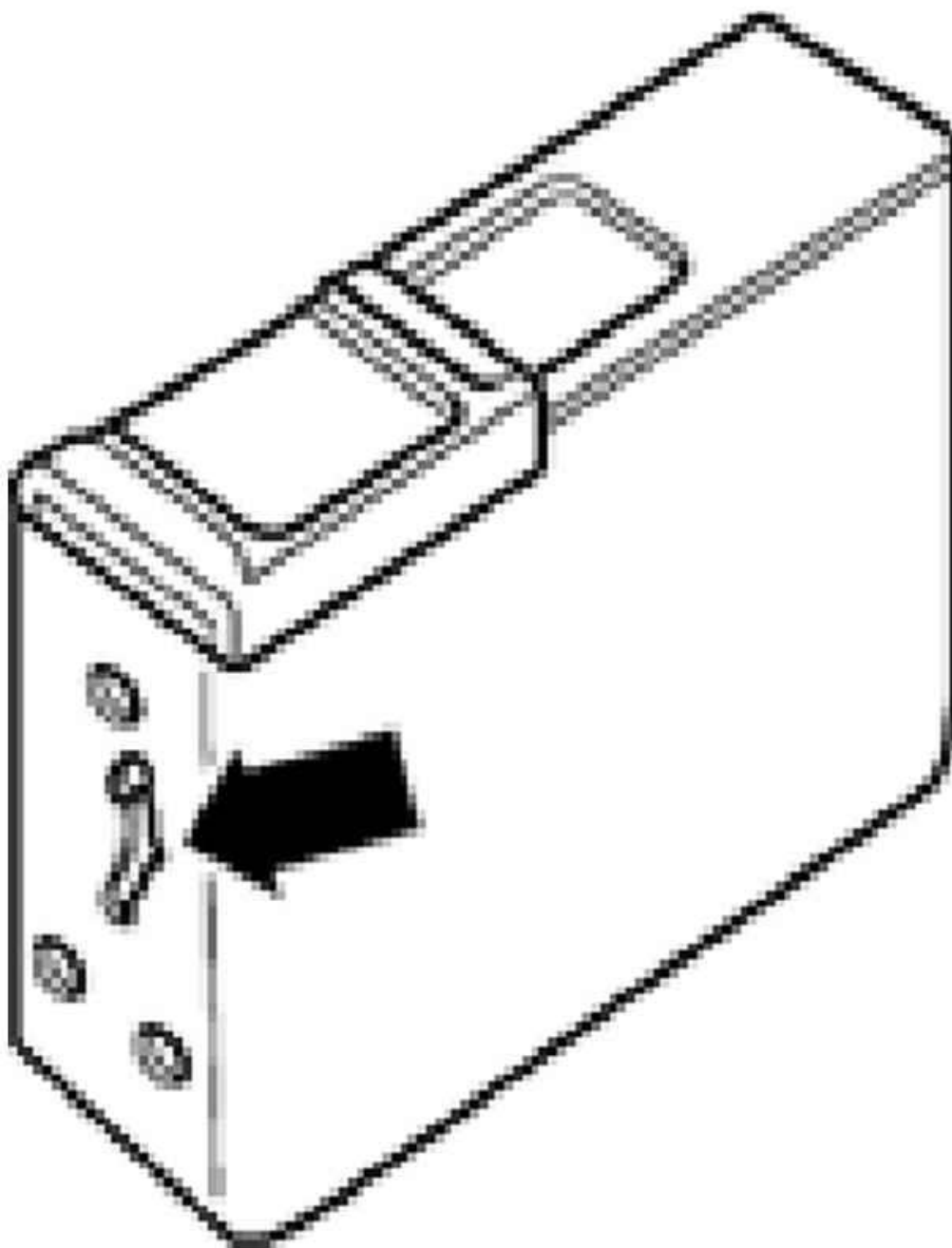
- Replace Clutch Vacuum Vent Valve Switch -F36-.
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory has been erased:

- Set the Readiness code again. See **READINESS CODE, SETTING** .

If specifications obtained:

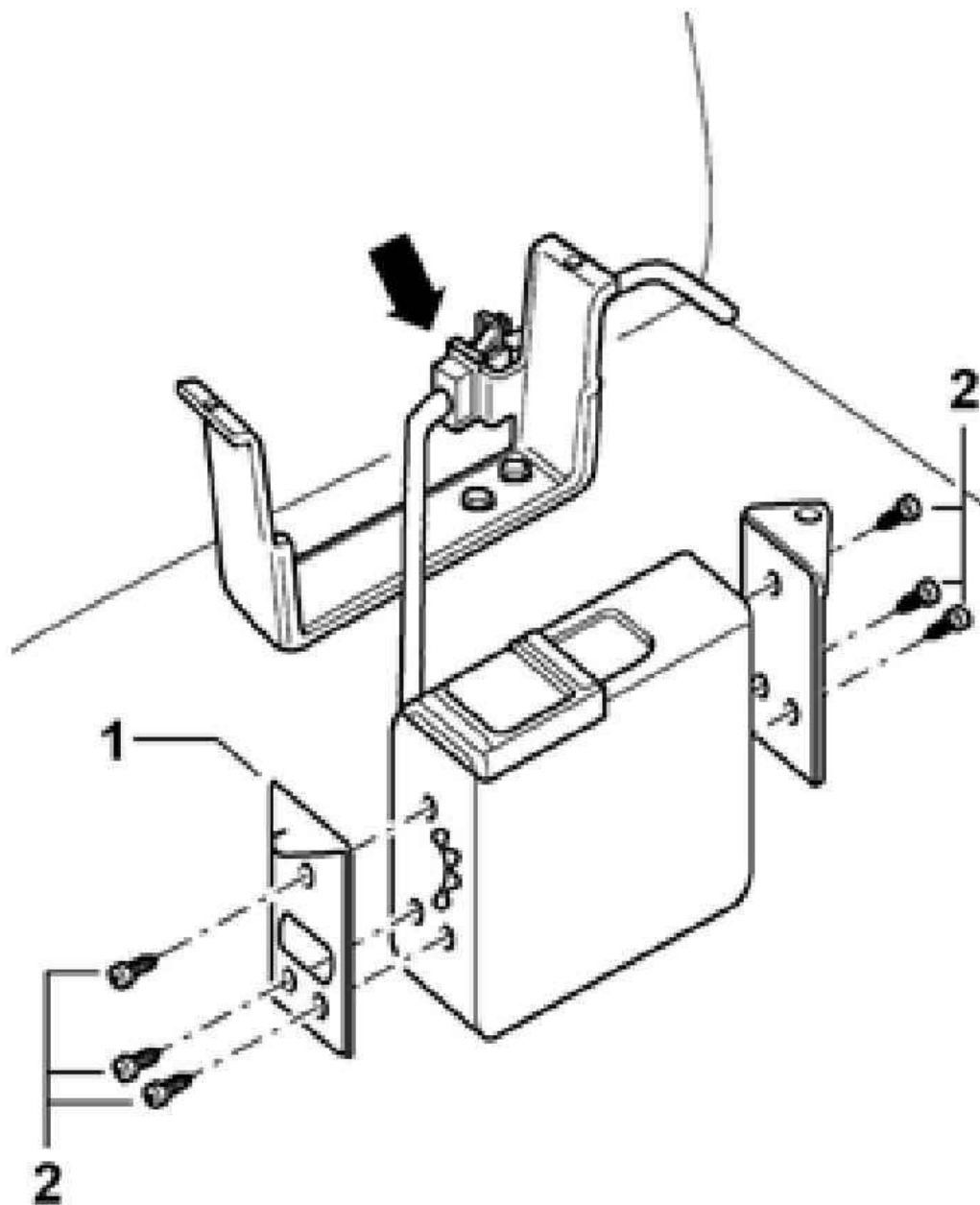
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03260194

Fig. 65: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and harness connector using Wiring diagram.



G03260195

Fig. 66: Identifying Clutch Vacuum Vent Valve Switch Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Terminal 1 + socket 2
- Terminal 1 + socket 28
- Terminal 2 + socket 46

From MY 2000

- Terminal 1 + socket 1
- Terminal 1 + socket 2
- Terminal 2 + socket 66
- Wire resistance: 1.5ohm maximum
- Check wires for shorting to: one another, Ground and Battery +
- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Intake Air Temperature (IAT) Sensor -G72-, checking

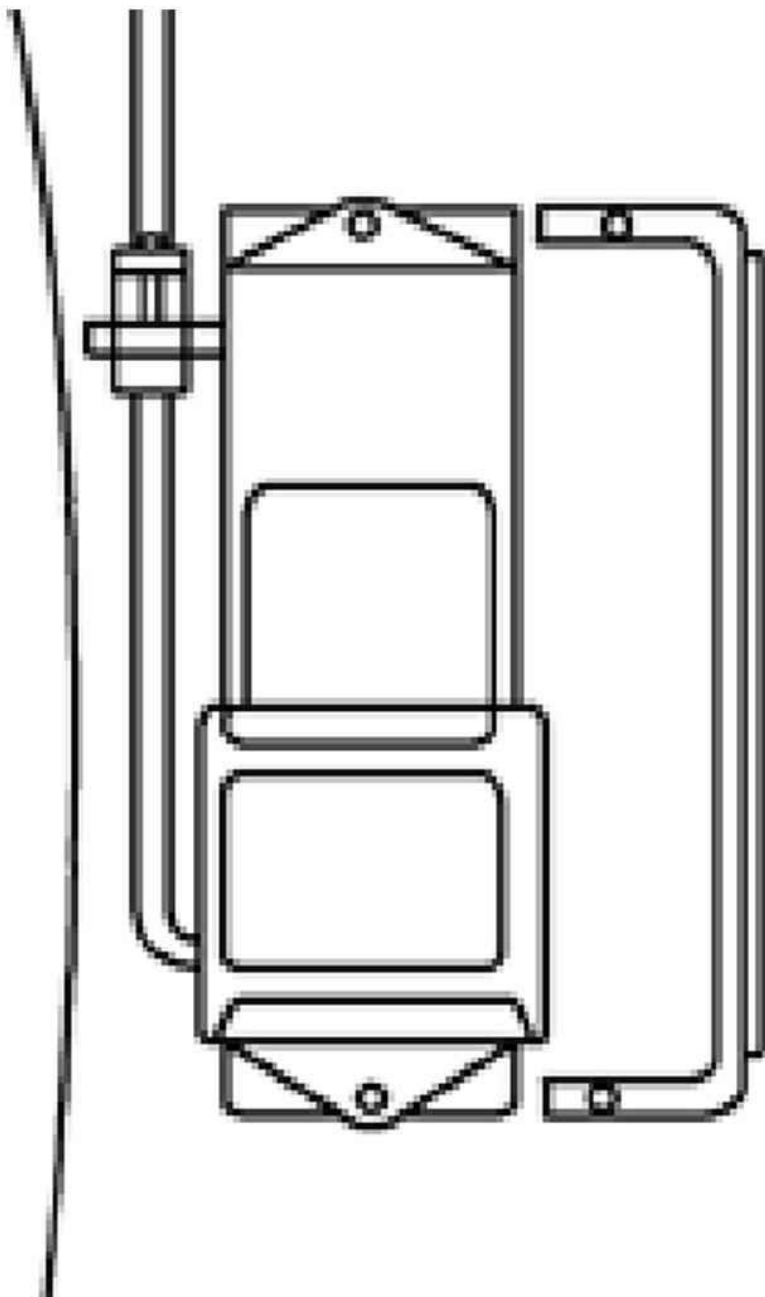
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):



G03260196

Fig. 67: Scan Tool Display - Intake Air Temperature Sensor (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

Select function XX

G03450528

Fig. 68: Scan Tool Display - Intake Air Temperature Sensor (2 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

Read measuring value block

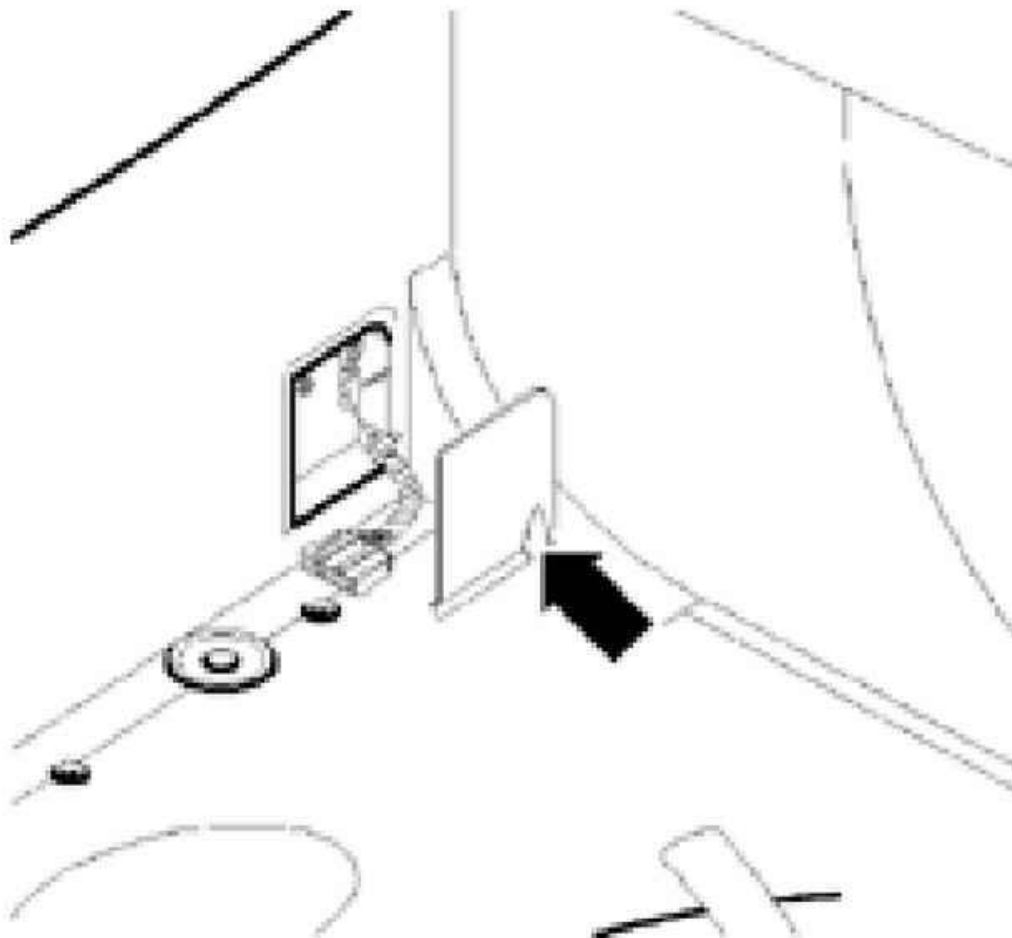
HELP

Input Display group number XXX

G03450529

Fig. 69: Scan Tool Display - Intake Air Temperature Sensor (3 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -0- and -7- to select "Display group 7".
- Press -Q- button to enter input.
- Display will appear as shown:



G03260199

Fig. 70: Scan Tool Display - Intake Air Temperature Sensor (4 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If an unrealistic value appears in Display zone 3 or a substitute temperature of 136.8 °C is displayed

- Check Intake Air Temperature (IAT) Sensor -G72- and wiring to sensor as follows:
- Press --> button.

Display will appear as shown:

Read measuring value block

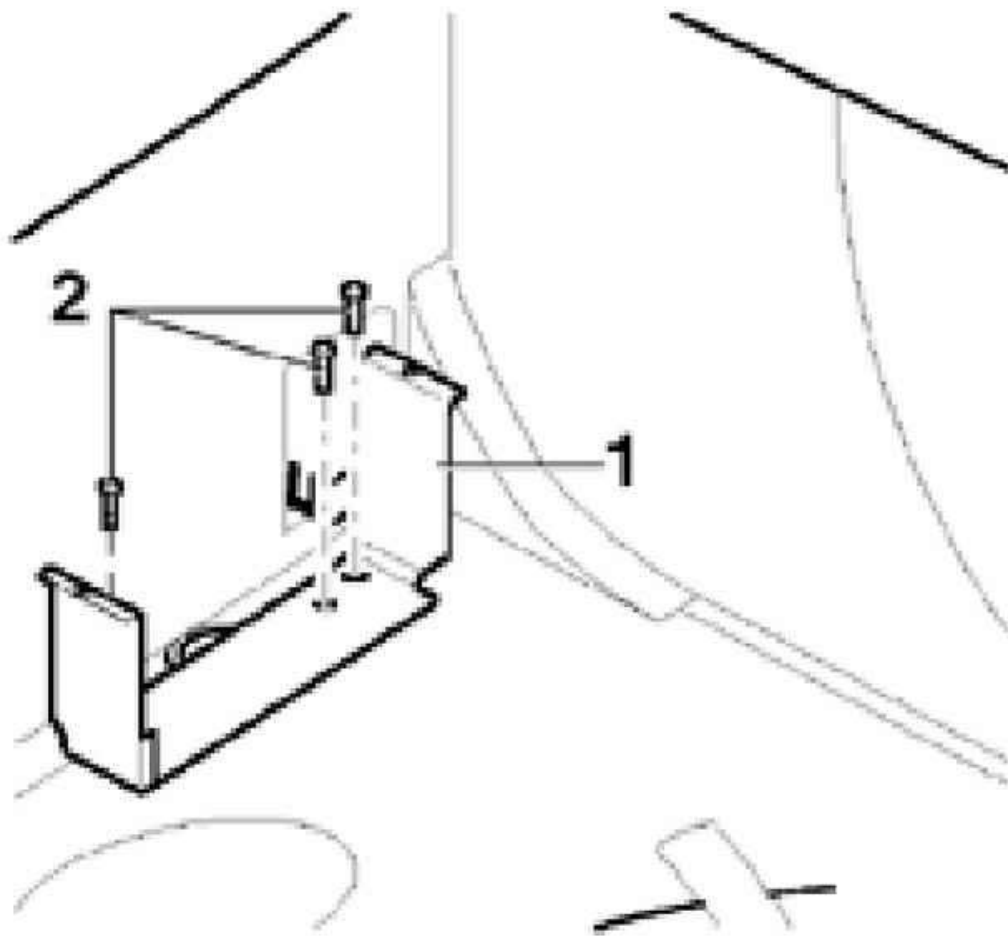
HELP

Input Display group number XXX

G03450531

Fig. 71: Scan Tool Display - Intake Air Temperature Sensor (5 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.
- Switch OFF ignition.
- Disconnect -G72- harness connector: Component locations overview. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .



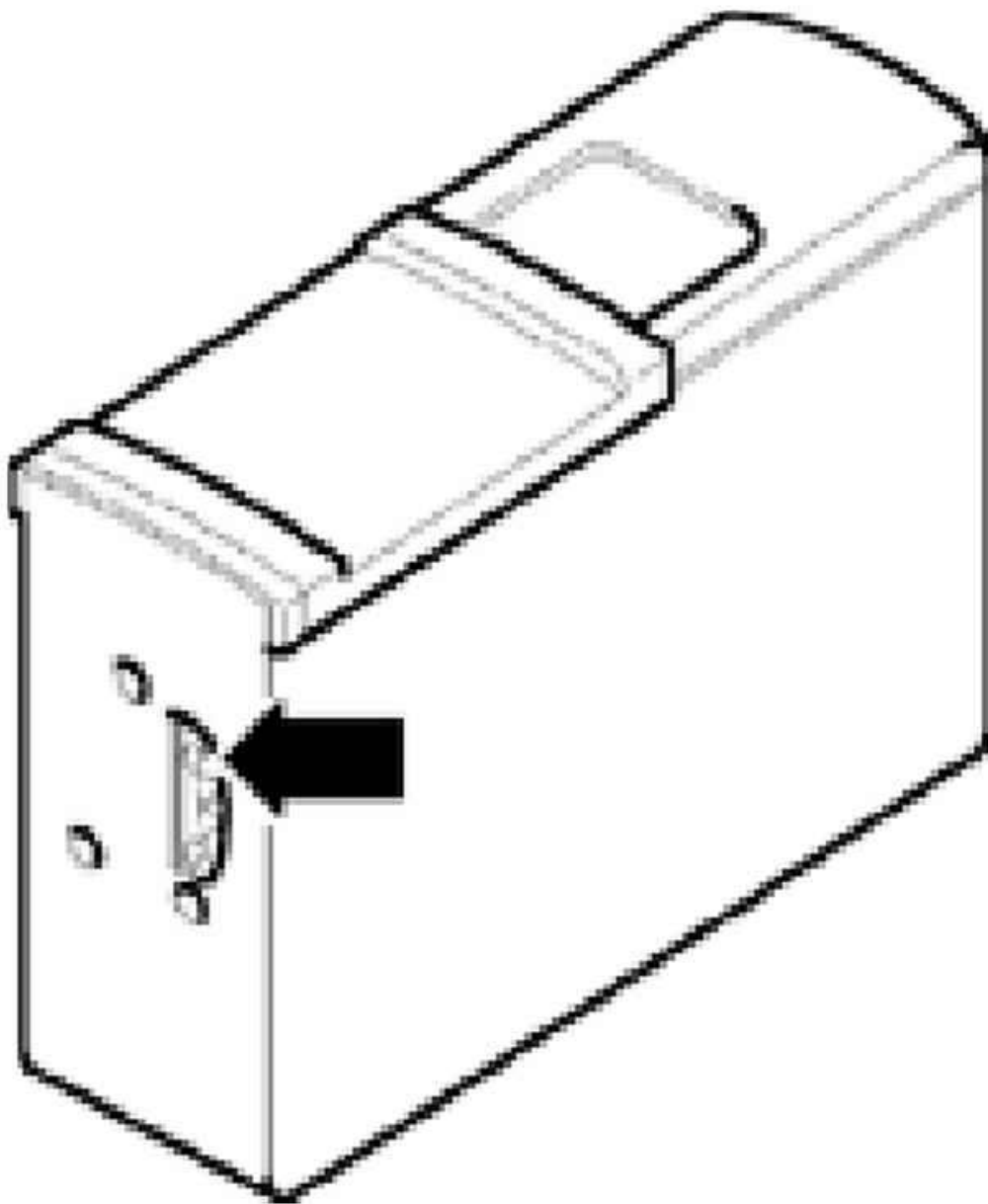
G03260201

Fig. 72: Identifying IAT Sensor -G72- Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Measure resistance between sensor terminals 1 + 2.

Specification (see **Fig. 73**):

Scale A shows resistance values for temperature range 0 to 50 °C and scale B the values for temperature range 50 to 100 °C.



G03260202

Fig. 73: IAT Sensor Resistance Versus Temperature Range Graph
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Examples:

- 30 °C corresponds to a resistance from 1500 to 2000ohm
- 80 °C corresponds to a resistance from 275 to 375ohm

If specification not obtained:

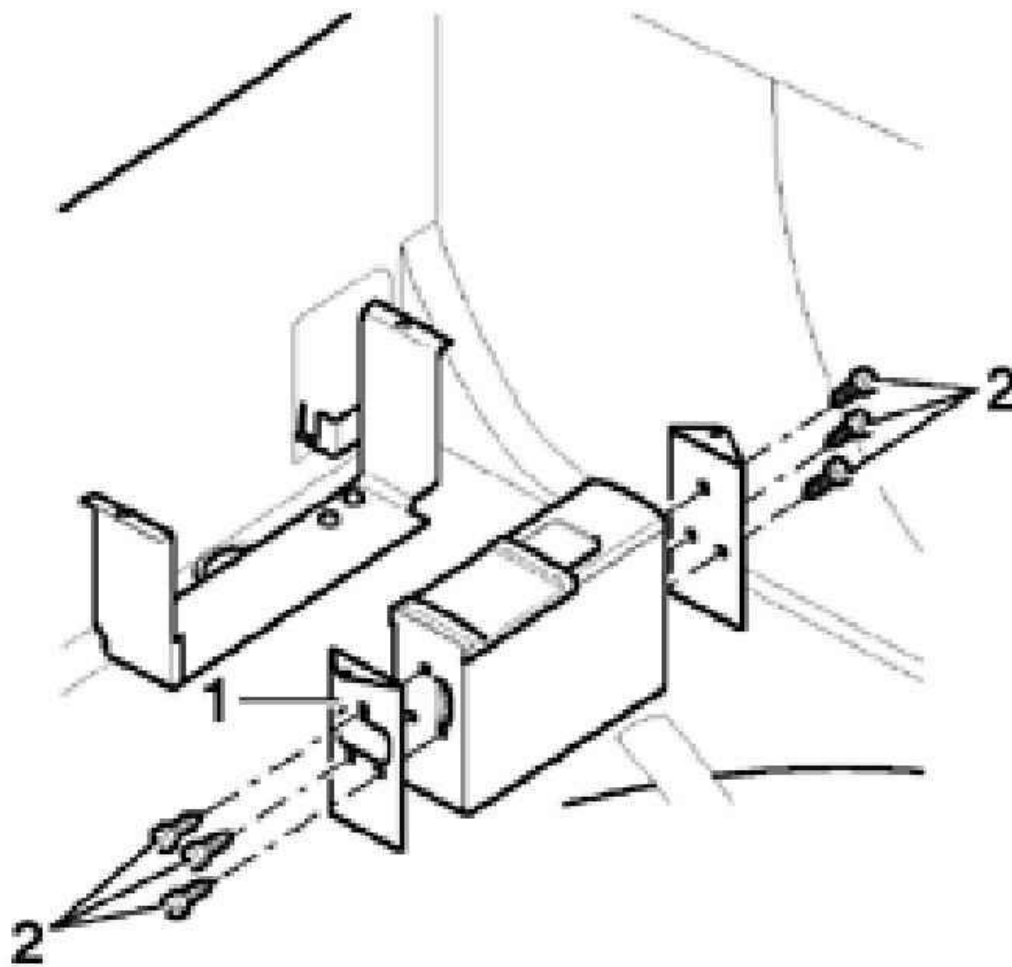
- Replace Intake Air Temperature (IAT) Sensor -G72-.
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If specification obtained:

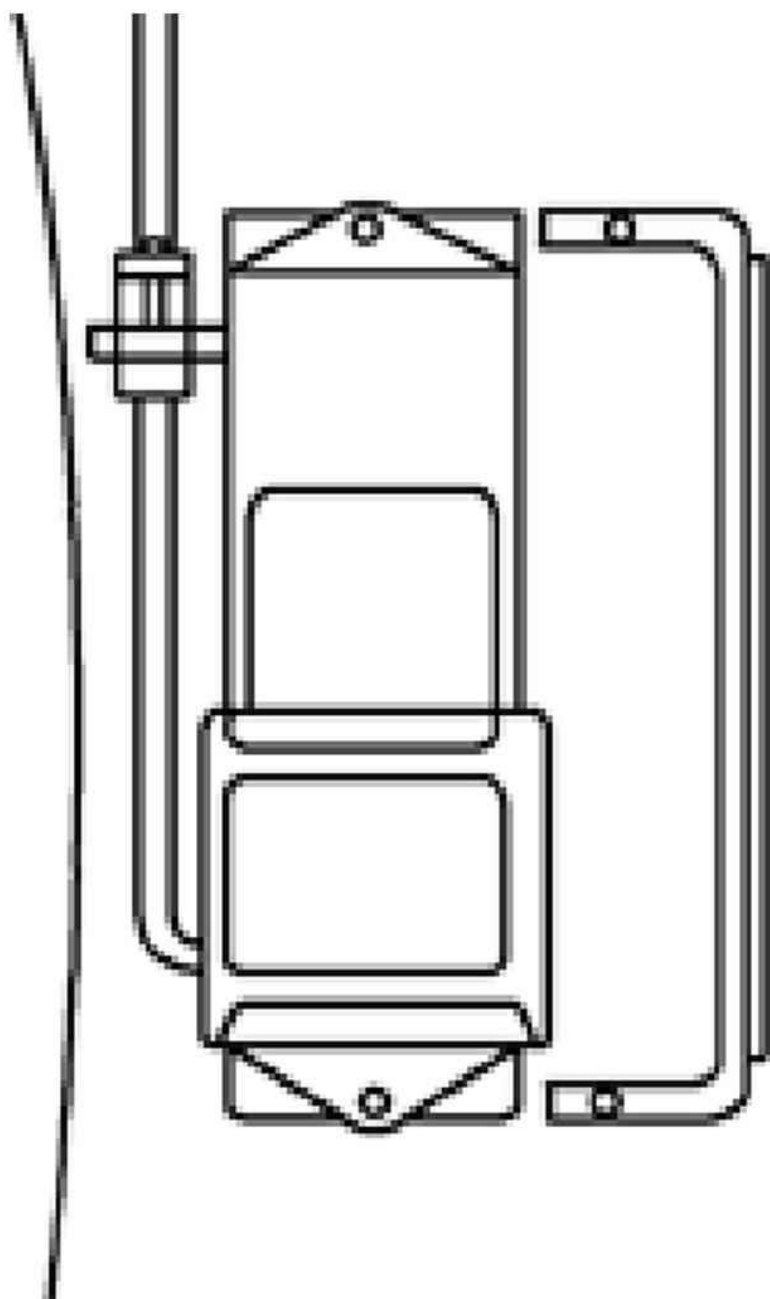
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03260203

Fig. 74: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring between Test Box and connector for open circuit using Wiring diagram.



G03260204

Fig. 75: Identifying IAT Sensor Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Terminal 1 + socket 25

- Terminal 2 + socket 13
- Wire resistance: maximum 1.5ohm
- Check wires for short to one another, to Ground and to Battery +
- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Fuel Temperature Sensor -G81-, checking

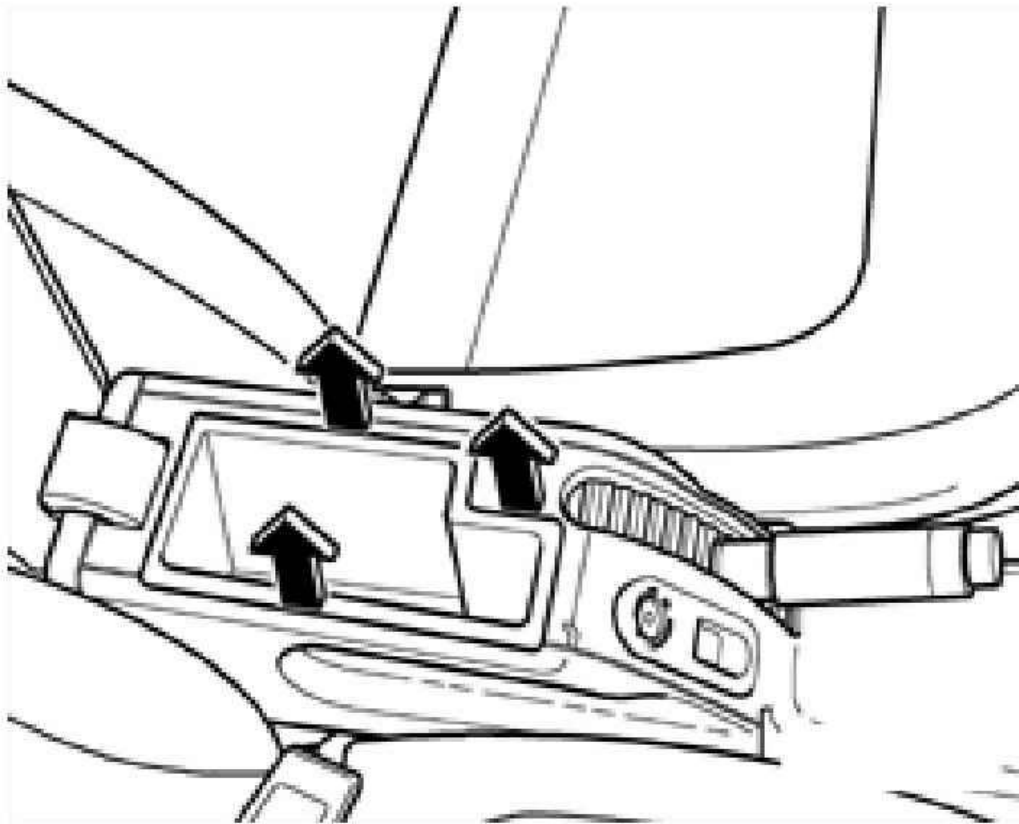
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):



G03260205

Fig. 76: Scan Tool Display - Fuel Temperature Sensor (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

Select function XX

G03450537

Fig. 77: Scan Tool Display - Fuel Temperature Sensor (2 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block"
- Press -Q- button to enter input.

Display will appear as shown:

Read measuring value block

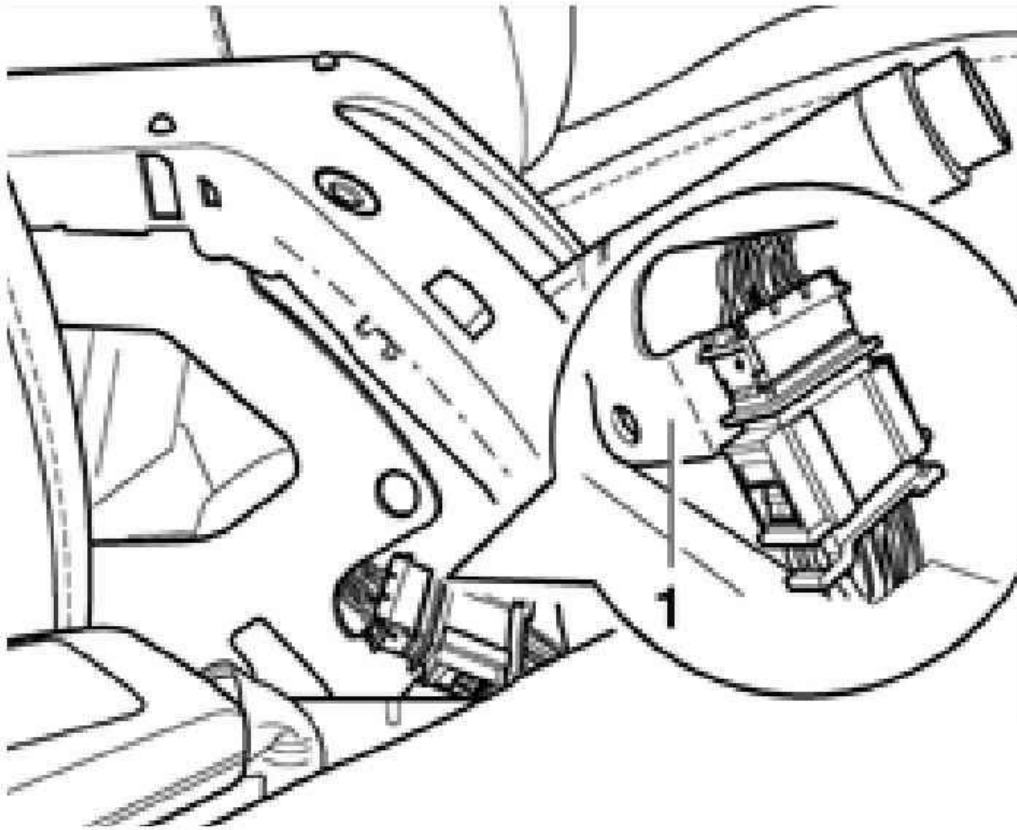
HELP

Input Display group number XXX

G03450538

Fig. 78: Scan Tool Display - Fuel Temperature Sensor (3 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -0- and -7- to select "Display group 7".
- Press -Q- button to enter input.
- Display will appear as shown:



G03260208

Fig. 79: Scan Tool Display - Fuel Temperature Sensor (4 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If an unrealistic value appears in Display zone 1 or a substitute temperature of -5.4 C is displayed:

- Check Fuel Temperature Sensor -G81- and wiring to sensor as follows:
- Press --> button.

Display will appear as shown.

Read measuring value block

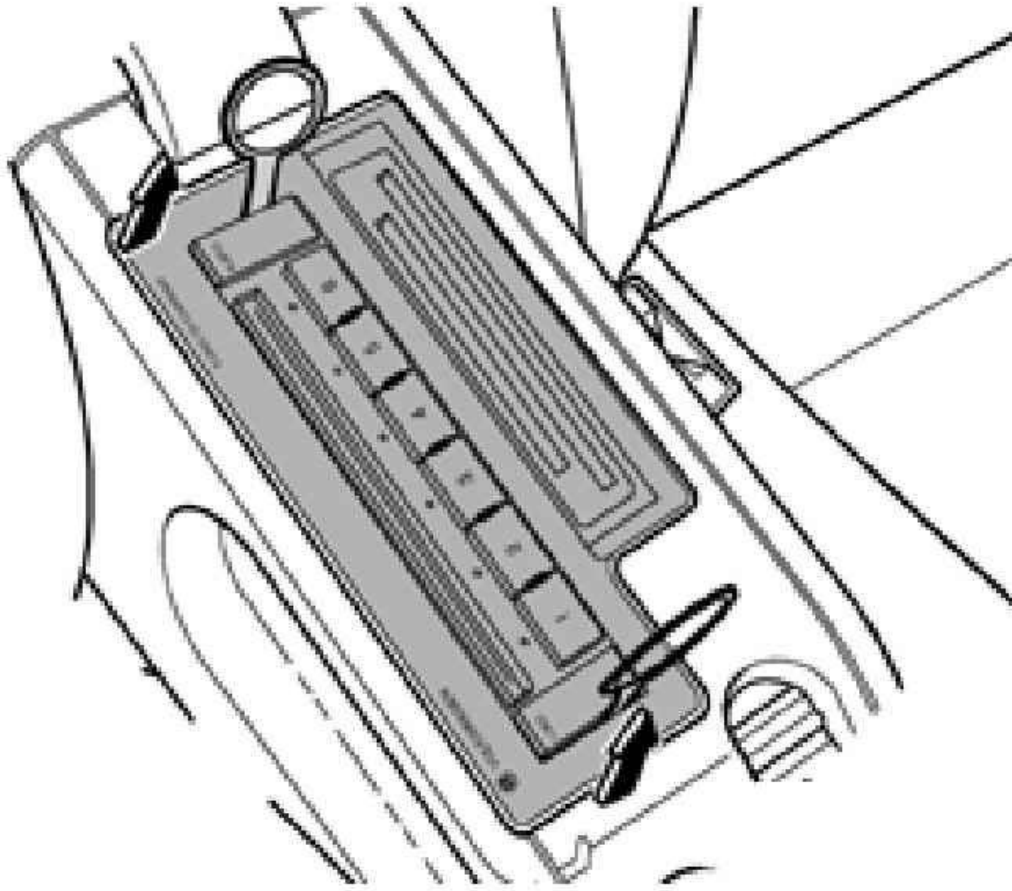
HELP

Input Display group number XXX

G03450540

Fig. 80: Scan Tool Display - Fuel Temperature Sensor (5 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Switch OFF ignition.
- Disconnect 10-pin -G81- harness connector (connection to Diesel injection pump metering control).



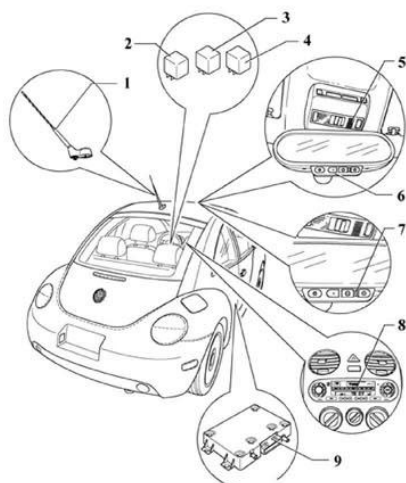
G03260210

Fig. 81: Identifying 10-Pin -G81- Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Measure Fuel Temperature sensor resistance between terminals 4 + 7.

Specification chart:

Scale A shows resistance values for temperature range 0 to 50 °C and scale B the values for temperature range 50 to 100 °C.



**1 - Antenna -R11-,
Antenna Amplifier -
R24- and Antenna
for Navigation
System (GPS) -R50-**

- ◆ On roof, rear
- ◆ Removing and installing

**2 - Dual Horn Auxiliary
Relay -J733-**

- ◆ On 13-position auxiliary relay panel, above relay panel.

**3 - Auxiliary Emergency
Flasher Relay -J517-**

- ◆ On 13-position auxiliary relay panel, above relay panel.

**4 - Warning Lamp
Auxiliary Relay -
J734-**

- ◆ On 13-position auxiliary relay panel, above relay panel.

**5 - Telephone
Microphone -R38-**

- ◆ Integrated with front interior light module.
- ◆ Removing and installing

**6 - Telematic Control
Head -E264-**

- ◆ Integrated with rear view mirror.
- ◆ OnStar[®] buttons, description
- ◆ Includes telematics indicator lamp -7-.
- ◆ Removing and installing

**7 - Telematics Indicator
Lamp -K186-**

- ◆ In Telematic Control Head.
- ◆ LED indicates telematic system operational status.
- ◆ Description
- ◆ Telematic system, troubleshooting using telematics indicator lamp

8 - Radio -R-

- ◆ In center console.

**9 - Telematic Control
Module -J499-**

- ◆ Installed behind right rear side panel trim under rear speaker.
- ◆ Removing and installing
- ◆ Control module multi-pin connector terminal assignments

G03260211

Fig. 82: Fuel Temperature Sensor Resistance Versus Temperature Range Graph
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Examples:

- 30 °C corresponds to a resistance between 1500 and 2000 ohm
- 80 °C corresponds to a resistance between 275 and 375 ohm

If specification not obtained:

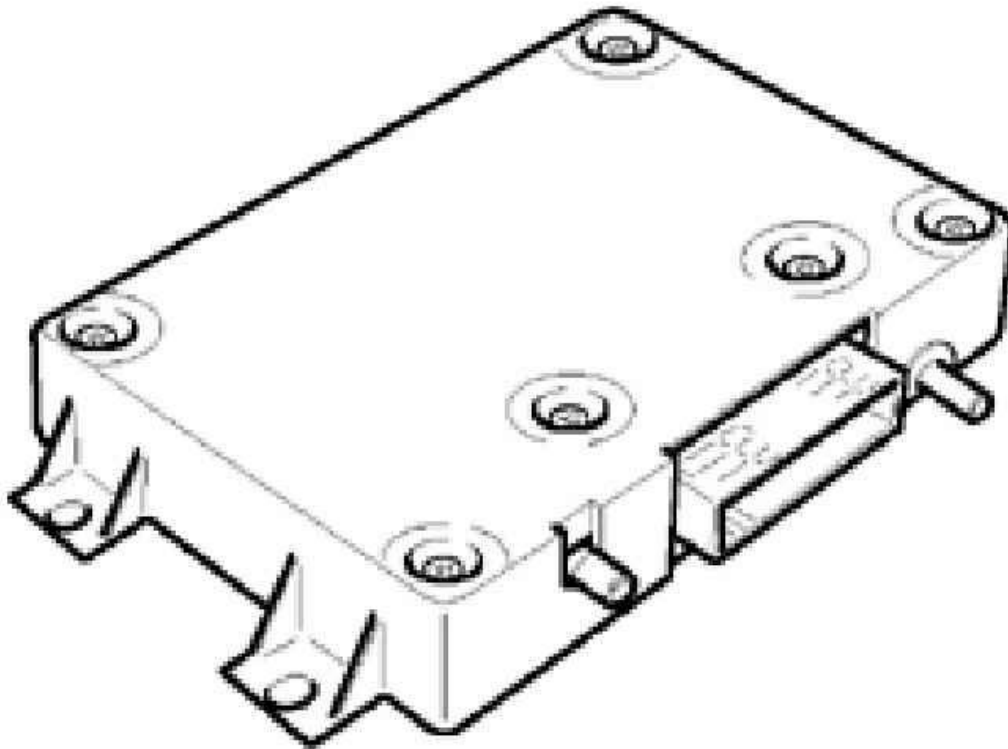
- Replace Diesel injection pump. See **DIESEL INJECTION PUMP, REMOVING AND INSTALLING** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If specification obtained:

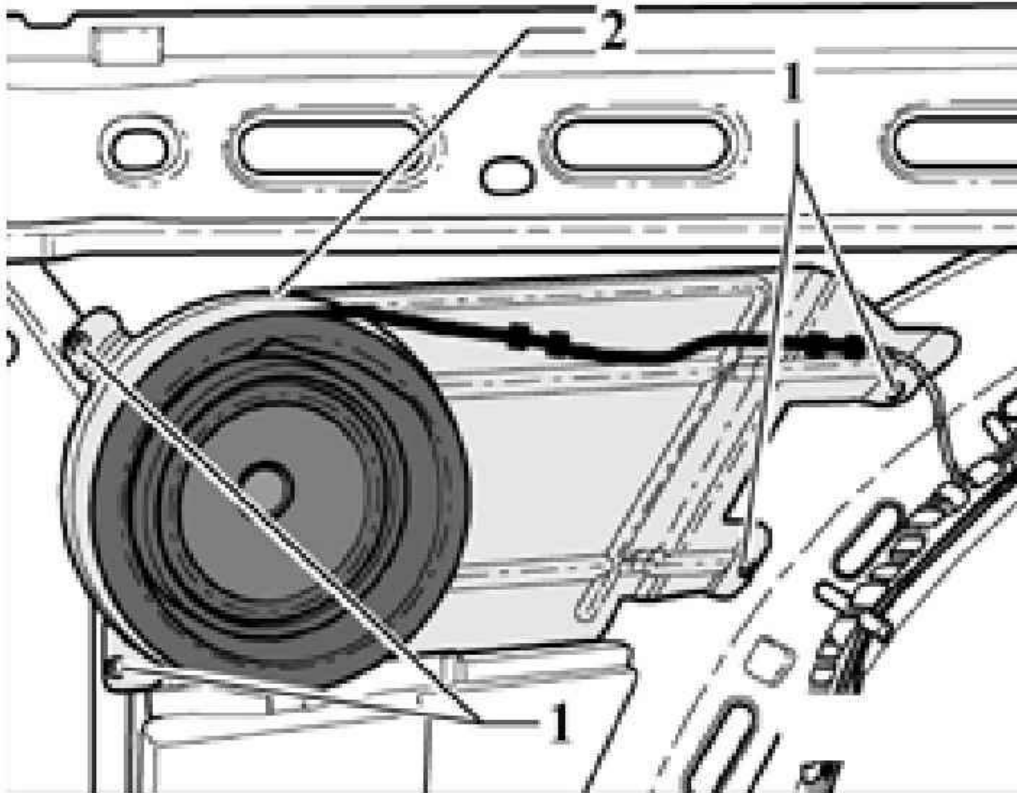
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03260212

Fig. 83: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and harness connector using Wiring diagram.



G03260213

Fig. 84: Identifying 10-Pin Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 7 + socket 53
- Terminal 4 + socket 76

From MY 2000

- Terminal 7 + socket 111

- Terminal 4 + socket 103
- Wire resistance: 1.5 ohm maximum
- Check wires for short to one another, to Ground and to Battery +
- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Modulating piston displacement sensor -G149- and quantity adjuster -N146-, checking

The quantity adjuster -N146- is an electro-magnetic swivel type positioner, controlled by the ECM via regulated duty cycle (ON-OFF ratio). The eccentric shaft on -N146- moves the Modulating piston on the high pressure piston thereby regulating the quantity of fuel injected.

The Modulating piston displacement sensor -G149- communicates the position of -N146- to the ECM thereby determining the quantity of fuel to be injected.

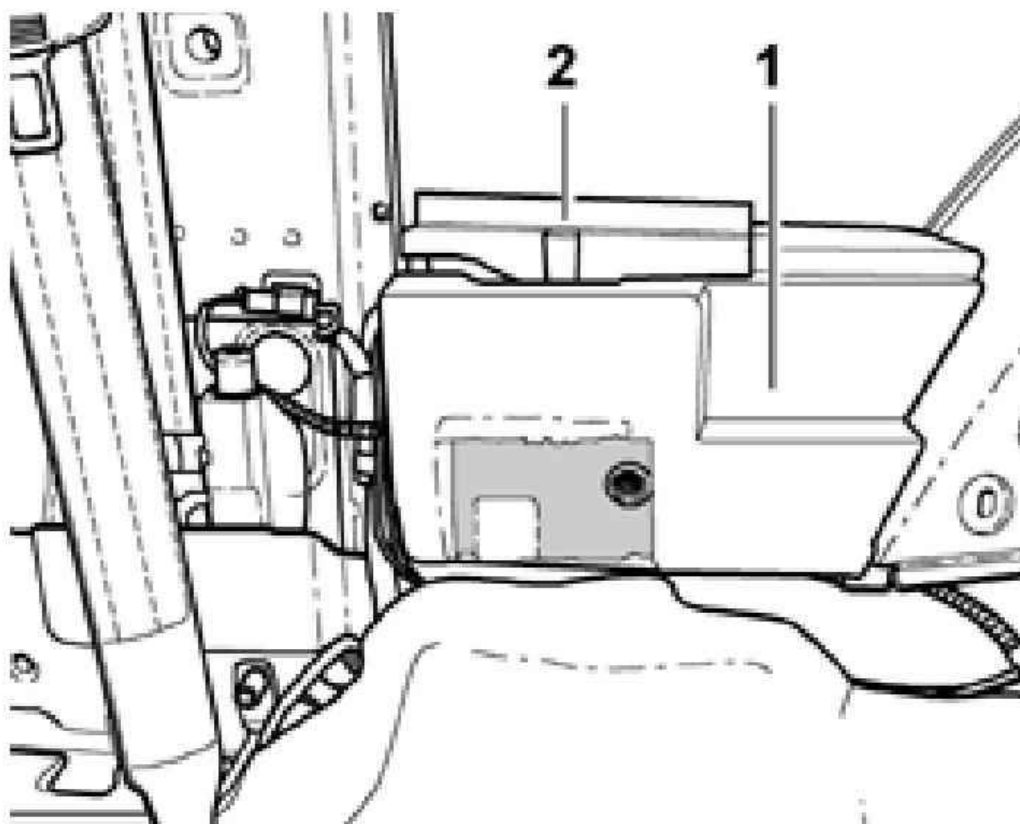
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):



G03260214

Fig. 85: Scan Tool Display - Modulating Piston Displacement Sensor & Quantity Adjuster (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

Select function XX

G03450546

Fig. 86: Scan Tool Display - Modulating Piston Displacement Sensor & Quantity Adjuster (2 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

Read measuring value block

HELP

Input Display group number XXX

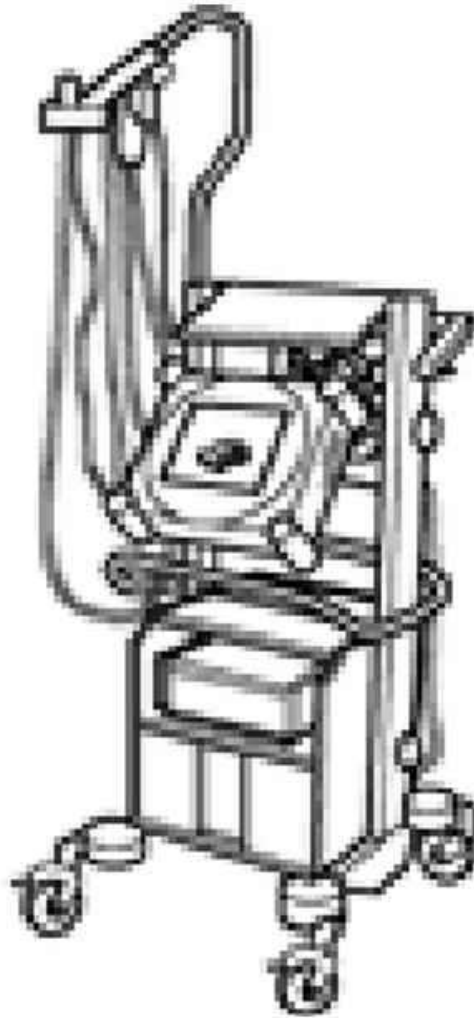
G03450547

Fig. 87: Scan Tool Display - Modulating Piston Displacement Sensor & Quantity Adjuster (3 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -0- and -1- to select "Display group 1".
- Press -Q- button to enter input.

Display will appear as shown:

VAS 5051



G03260217

Fig. 88: Scan Tool Display - Modulating Piston Displacement Sensor & Quantity Adjuster (4 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check Engine Coolant Temperature value in Display zone 4.
- Specification: 85 °C minimum
- Continue with check only when temperature spec. is obtained.
- Check value in Display zone 3 (Voltage from Modulating piston movement).

- Check Modulating piston displacement sensor -G149- Voltage supply value in Display zone 3.

VAS 5051



G03260218

Fig. 89: Scan Tool Display - Modulating Piston Displacement Sensor & Quantity Adjuster (5 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Specification: 1.450 to 2.000 Volts

If specification not obtained:

- Check Modulating piston displacement sensor -G149- and quantity adjuster as described in following:

Modulating piston displacement sensor -G149-, checking

- Press --> button.

Display will appear as shown:

Rapid data transfer

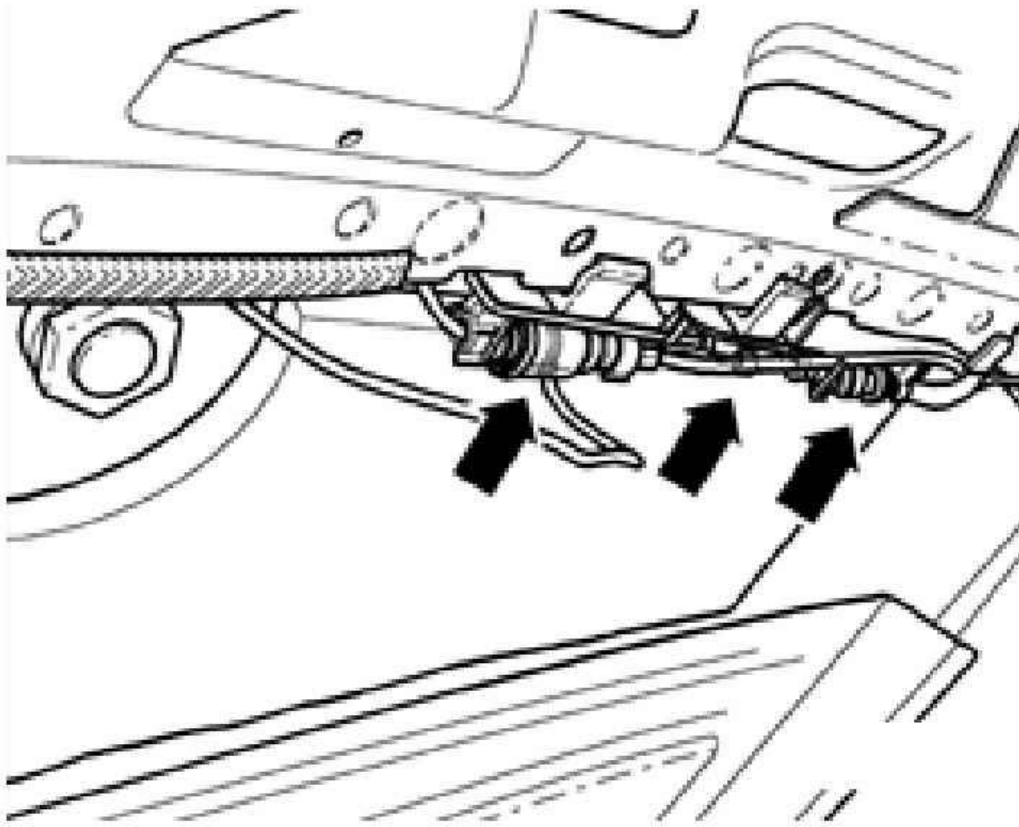
HELP

Select function XX

G03450550

Fig. 90: Scan Tool Display - Modulating Piston Displacement Sensor
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.
- Switch OFF ignition.
- Disconnect 10-pin Fuel Temperature sensor harness connector (connection to Diesel injection pump metering control).



G03260220

Fig. 91: Identifying 10-Pin Fuel Temperature Sensor Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch Fluke 83 multimeter to resistance range.
- Measure resistance between connector terminals: 1 + 2 and 2 + 3.
- Specification: 4.9 to 7.5ohm

If specification not obtained:

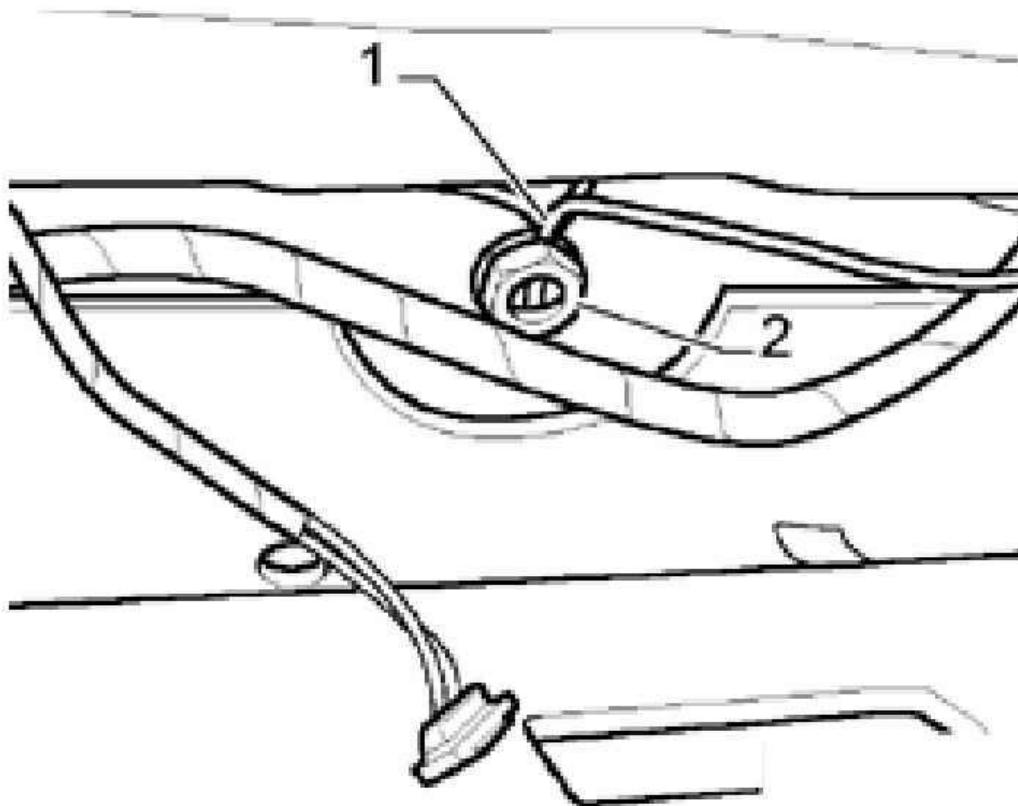
- Replace Diesel injection pump. See **DIESEL INJECTION PUMP, REMOVING AND INSTALLING** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If specification obtained:

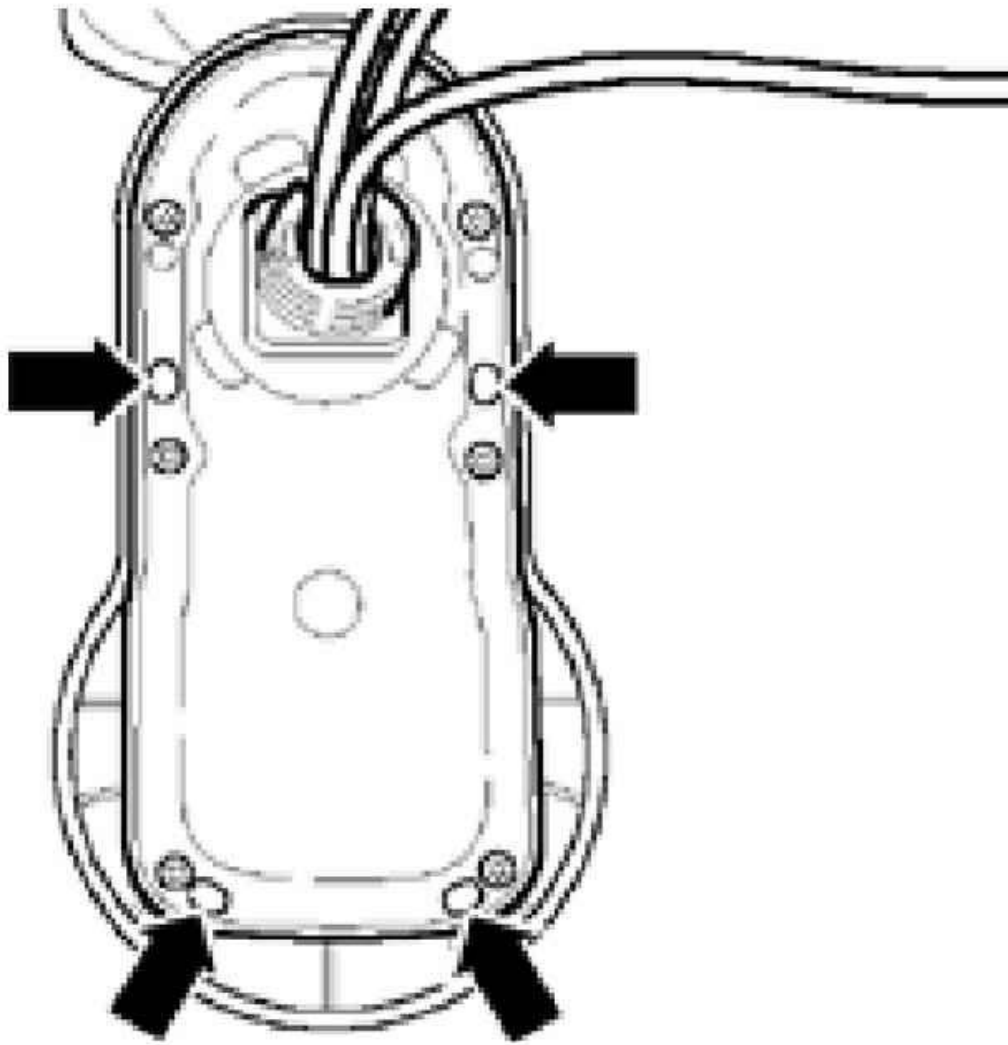
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03260221

Fig. 92: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and harness connector using Wiring diagram.



G03260222

Fig. 93: Identifying 10-Pin Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 1 + socket 56
- Terminal 2 + socket 57
- Terminal 3 + socket 64

From MY 2000

- Terminal 1 + socket 108
- Terminal 2 + socket 106
- Terminal 3 + socket 99
- Wire resistance: 1.5ohm maximum
- Check wires for shorting to: one another, Ground and Battery +
- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Quantity adjuster -N146-, checking

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

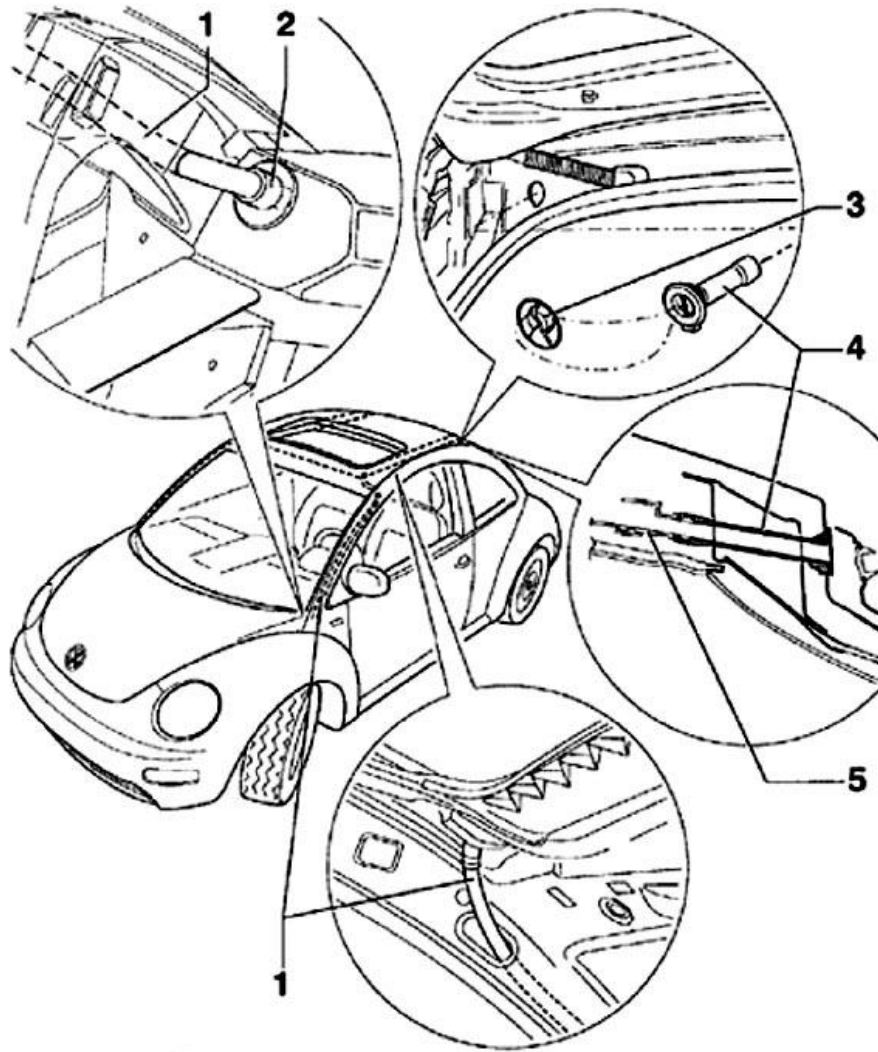
Select function XX

G03450554

Fig. 94: Scan Tool Display - Quantity Adjuster
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.

- Switch OFF ignition.
- Disconnect 10-pin Fuel Temperature sensor harness connector (connection to Diesel injection pump metering control).



1 - Front water drain hoses.

2 - Front water drain valve.

3 - Cover.

4 - Water drain hose with
valve.

5 - Carrier unit.

Fig. 95: Identifying 10-Pin Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Measure resistance between connector terminals 5 + 6.
- Specification: 0.5 to 2.5 ohm

If specification not obtained:

- Replace Diesel injection pump. See **DIESEL INJECTION PUMP, REMOVING AND INSTALLING** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If specification obtained:

- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.

06A906018AB Motronic M5.9.2 HS V06 ➡

Coding 00000 **WSC 00000**

G03259765

Fig. 96: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and harness connector using Wiring diagram.

Rapid data transfer

HELP

Select function XX

G03259766

Fig. 97: Identifying 10-Pin Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 5 + sockets 2 and 28
- Terminal 6 + sockets 59, 66 and 80

From MY 2000

- Terminal 5 + sockets 1 and 2
- Terminal 6 + sockets 116 and 121
- Wire resistance: 1.5ohm maximum
- Check wires for shorting to: one another, Ground and Battery +.
- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Needle Lift Sensor -G80-, checking

The Needle Lift Sensor -G80- signal determines the start of injection. If -G80- fails, start of injection switches to open-loop control (based on engine speed and load). During normal operation, start of injection is controlled

via closed-loop function (based on engine speed, load and temperature).

Special tools

- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Switch OFF ignition.
- Disconnect Needle Lift Sensor -G80- harness connector. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .
- Measure resistance between sensor terminals.

Read measuring value block HELP

Input Display group number XXX

G03259767

Fig. 98: Identifying Needle Lift Sensor Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Specification: 80 to 120 ohm

If specification not obtained:

- Replace cyl. 3 fuel injector complete with -G80-. See item 13 .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If specification obtained:

- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.

Read measuring value block XX →

1 2 3 4

G03259768

Fig. 99: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and harness connector using Wiring diagram.

038906018M 1,9l R4 EDC G00SG 0602 →

Coding 00001

WSC XXXXX

G03259769

Fig. 100: Identifying Needle Lift Sensor Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 1 + socket 62
- Terminal 2 + socket 55

From MY 2000

- Terminal 1 + socket 109
- Terminal 2 + socket 101
- Wire resistance: 1.5ohm maximum
- Check wires for shorting to: one another, Ground and Battery +
- Specification: INFINITY ohm

If wiring OK:

- Replace ECM -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Diesel injection timing control range, checking

The EGR function occurs in Function 04 (basic setting). By using this procedure, the EGR valve is cycled every 10 seconds, so that in the measurement block 003 the extreme values can be read for EGR (Mass Air Flow sensor) in channel 3.

Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Connect VAG1551/1552 Scan Tool (See **VAG1551/1552 SCAN TOOL, CONNECTING**) and start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):

Rapid data transfer

HELP

Select function XX

G03259770

Fig. 101: Scan Tool Display - Diesel Injection Timing Control Range (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

Select function XX

G03450562

Fig. 102: Scan Tool Display - Diesel Injection Timing Control Range (2 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -4- buttons to select Function 04: "Basic setting".
- Press -Q- button to enter input.

Display will appear as shown:

Basic setting

HELP

Input Display group number XXX

G03450563

Fig. 103: Scan Tool Display - Diesel Injection Timing Control Range (3 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -0- and -4- to select "Display group 4".

Display will appear as shown:

021906018B Motronic ME7.1 G V06 →

Coding 00000 WSC XXXXX

G03259773

Fig. 104: Scan Tool Display - Diesel Injection Timing Control Range (4 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Specification (Display zone 3): 7.0 to 9.0° BTDC

After approx. 10 seconds, the Diesel injection adjuster is moved into the retarded position.

Display will appear as shown:

Rapid data transfer

HELP

Select function XX

G03259774

Fig. 105: Scan Tool Display - Diesel Injection Timing Control Range (5 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Specification (Display zone 3): 3.0 to 5.0° BTDC

If specifications not obtained:

- Check Cold Start injector as follows:
- Press --> button.
- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.
- Switch OFF ignition.
- Disconnect harness connector from Diesel injection pump. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .
- Measure resistance between connector terminals 9 + 10.
 - Specification: 12 to 20 ohm

Rapid data transfer

Q

11 - Login procedure

G03259775

Fig. 106: Identifying 10-Pin Connector Terminals

Courtesy of VOLKSWAGEN OF AMERICA, INC.

If specification not obtained:

- Replace Cold Start injector -N108-. See **INTAKE MANIFOLD CHANGE-OVER VALVE, SERVICING** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If specification obtained:

- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.

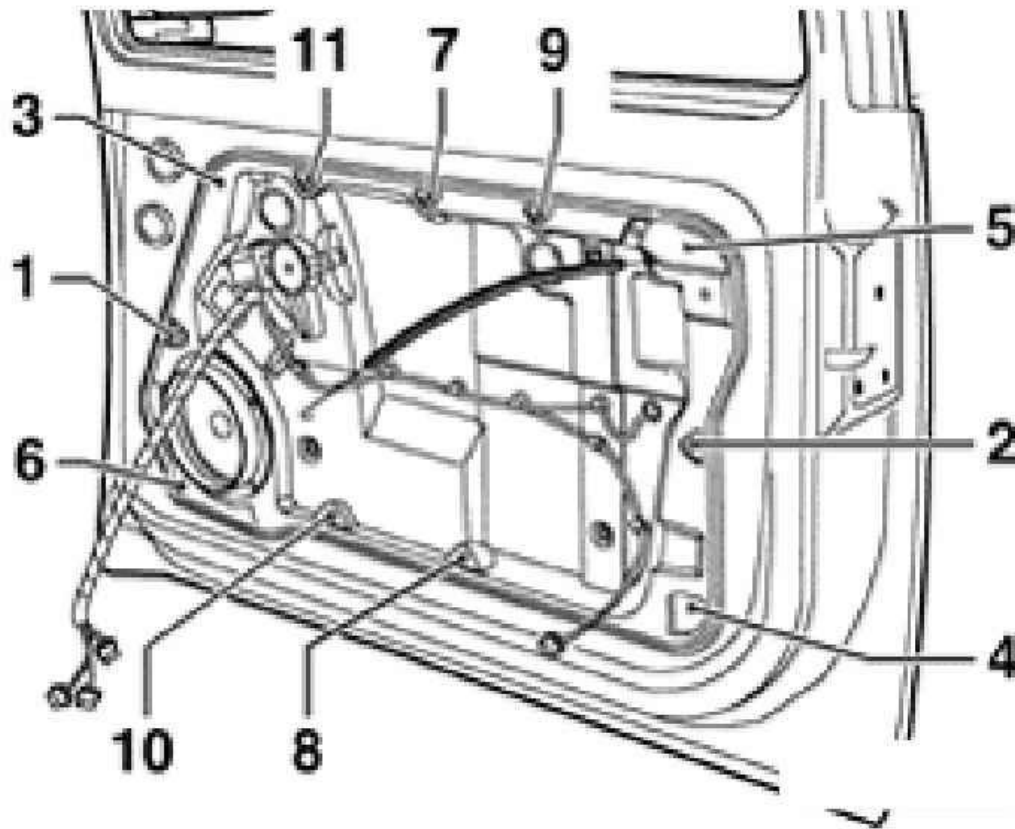
Login procedure

Input Code Number XXXXX

G03259776

Fig. 107: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and 10-pin harness connector using Wiring diagram.



G03259353

Fig. 108: Identifying 10-Pin Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 9 + socket 79
- Terminal 10 + sockets 2 + 28

From MY 2000

- Terminal 9 + socket 114
- Terminal 10 + sockets 1 + 2
- Wire resistance: 1.5ohm maximum

- Check wires for shorting to: one another, Ground and Battery +
- Specification: INFINITY ohm

If wiring OK

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Boost pressure control, checking

Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

NOTE: To check Boost pressure control it is essential to first know the actual Boost pressure value independent of the Boost pressure control limits.

See **CHARGE AIR PRESSURE SYSTEM, CHECKING** .

Test requirements

- Fuse 34 OK

Test sequence

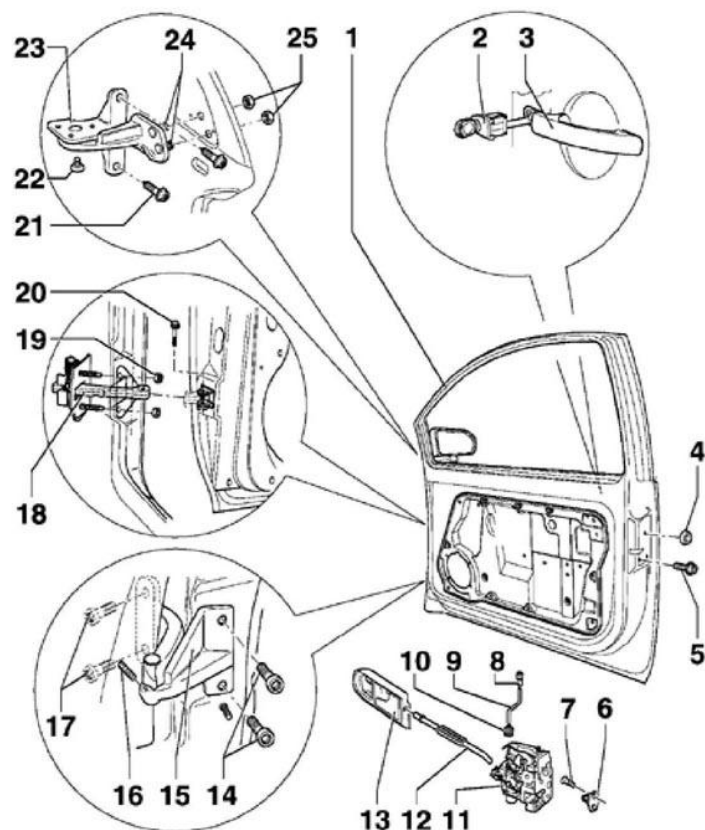
- Boost pressure using VAG1551/1552 Scan Tool during a test drive.

WARNING: For safe operation, use a second technician to operate test equipment and take readings from back seat, during test drive.

- Make sure Wastegate Bypass Regulator valve - N75- harness connector is connected.
- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.

- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):



- | | |
|---------------------------|------------------------------|
| 1 - Door | 13 - Interior release handle |
| 2 - Lock cylinder housing | 14 - Bolt/screw |
| 3 - Door handle with base | 15 - Door hinge |
| 4 - Cover cap | 16 - Grub screw |
| 5 - Bolt/screw | 17 - Bolt/screw |
| 6 - Lock plate | 18 - Door arrester |
| 7 - Bolt/screw | 19 - Nut |
| 8 - Locking button | 20 - Pin |
| 9 - Locking button | 21 - Bolt/screw |
| 10 - Boot | 22 - Bolt/screw |
| 11 - Door lock | 23 - Door hinge |
| 12 - Bowden cable | 24 - Pin |
| | 25 - Nut |

Fig. 109: Scan Tool Display - Boost Pressure Control (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

Select function XX

G03450570

Fig. 110: Scan Tool Display - Boost Pressure Control (2 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

Read measuring value block

HELP

Input Display group number XXX

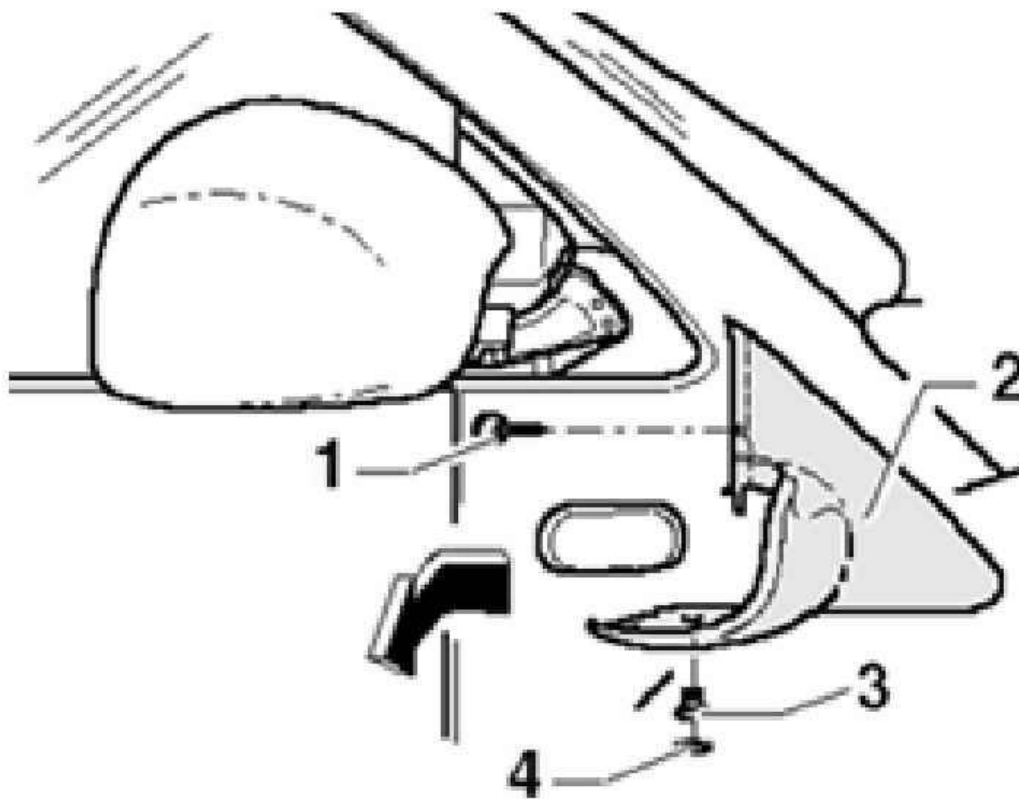
G03450571

Fig. 111: Scan Tool Display - Boost Pressure Control (3 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0-, -1- and -1- buttons to select "Display group 11"

- Press -Q- button to enter input.

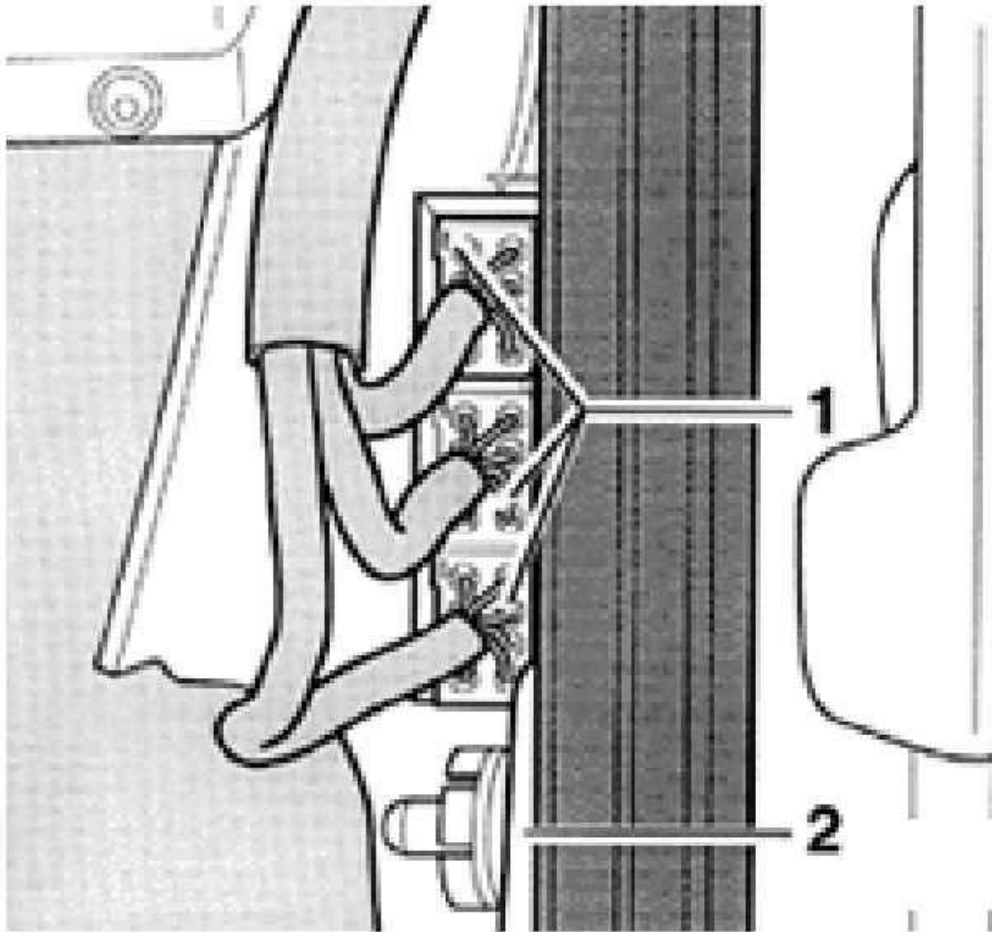
Display will appear as shown



G03259120

Fig. 112: Scan Tool Display - Boost Pressure Control (4 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Accelerate vehicle in 3rd gear from about 1500 RPM under Wide Open Throttle.
- Press PRINT button on VAG1551 at about 3000 RPM.
- Specification on VAG1551: 1720 to 2300 mbar (Display zone 3)



G03259121

Fig. 113: Scan Tool Display - Boost Pressure Control (5 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

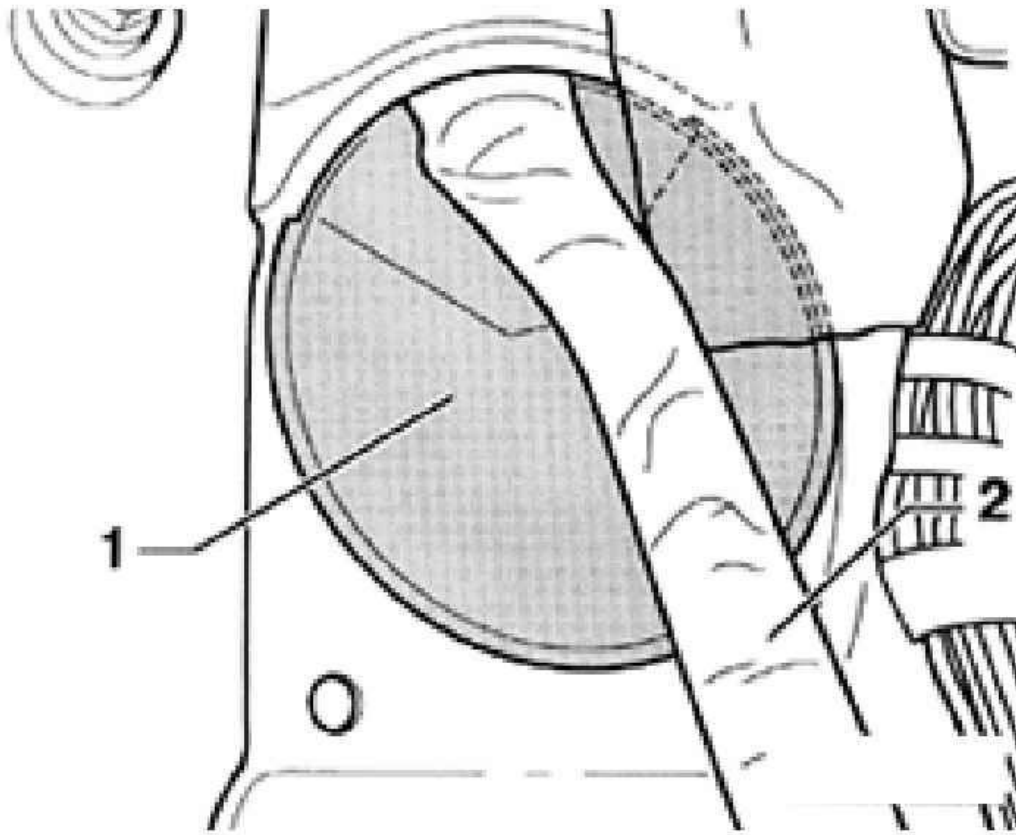
If measured Boost pressure is too low

- Check -N75- as follows:

Wastegate bypass regulator valve -N75-, electrically checking

- Switch OFF ignition.
- Disconnect -N75- harness connector. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .

- Switch Fluke 83 multimeter to resistance range.
- Measure resistance between -N75- terminals using multimeter.



G03259122

Fig. 114: Measuring Resistance Between Wastegate Bypass Regulator Valve -N75- Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Specification: 14 to 20 ohm

If specification not obtained:

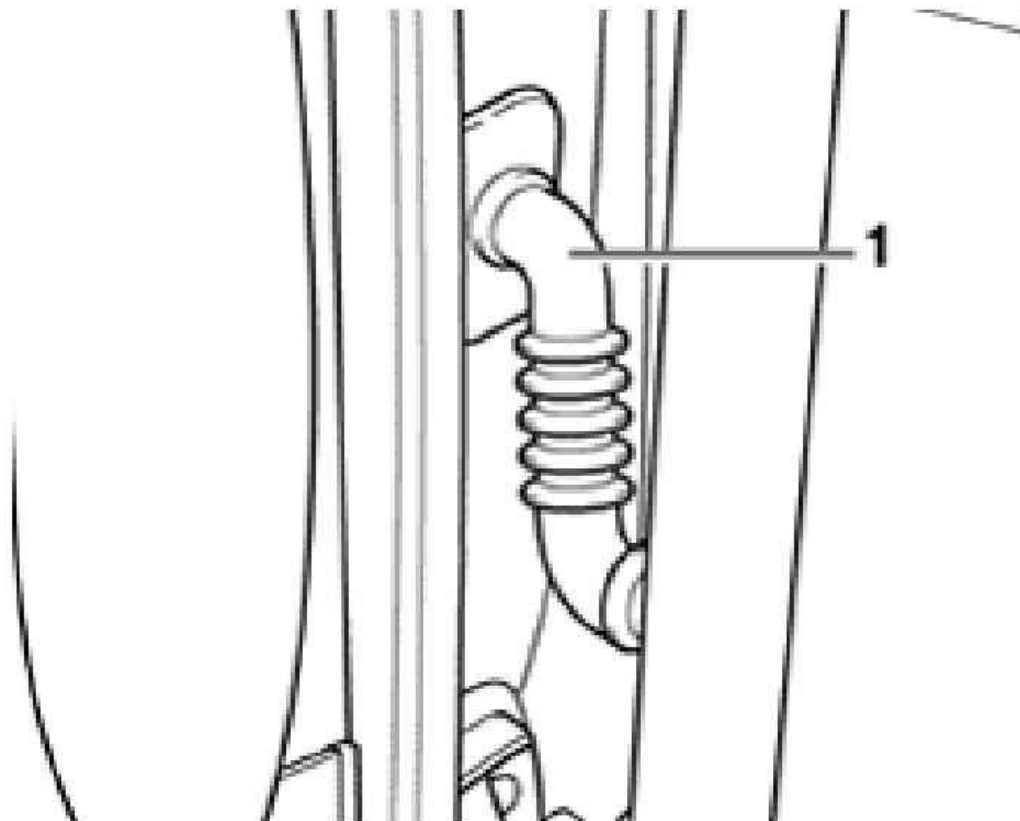
- Replace Wastegate Bypass Regulator valve - N75-.
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Wastegate Bypass regulator valve -N75- Voltage supply, checking

- Switch OFF ignition.
- Disconnect harness connector off valve. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .
- Connect Fluke 83 multimeter between terminal 1 and Ground using jumper wires from VW 1594 Adapter kit.



G03259123

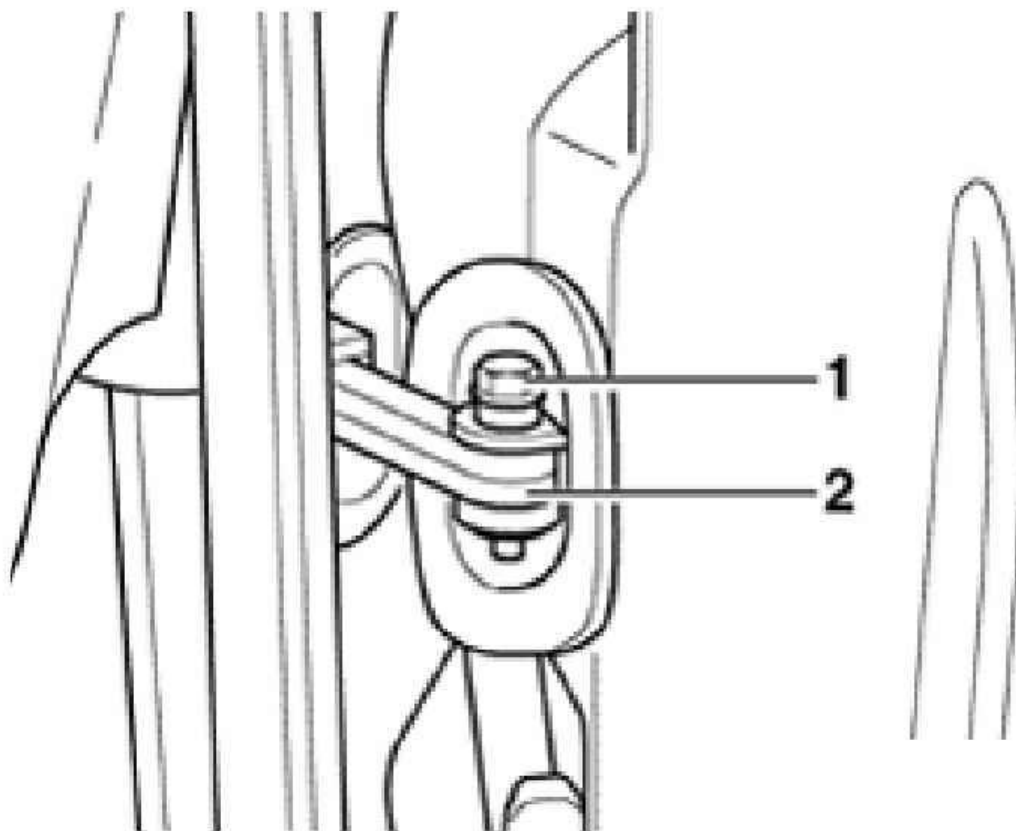
Fig. 115: Identifying Wastegate Bypass Regulator Valve -N75- Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch Fluke 83 multimeter to 20 Volt range.
- Switch ON ignition.

- Specification: approx. battery Voltage

If specification not obtained:

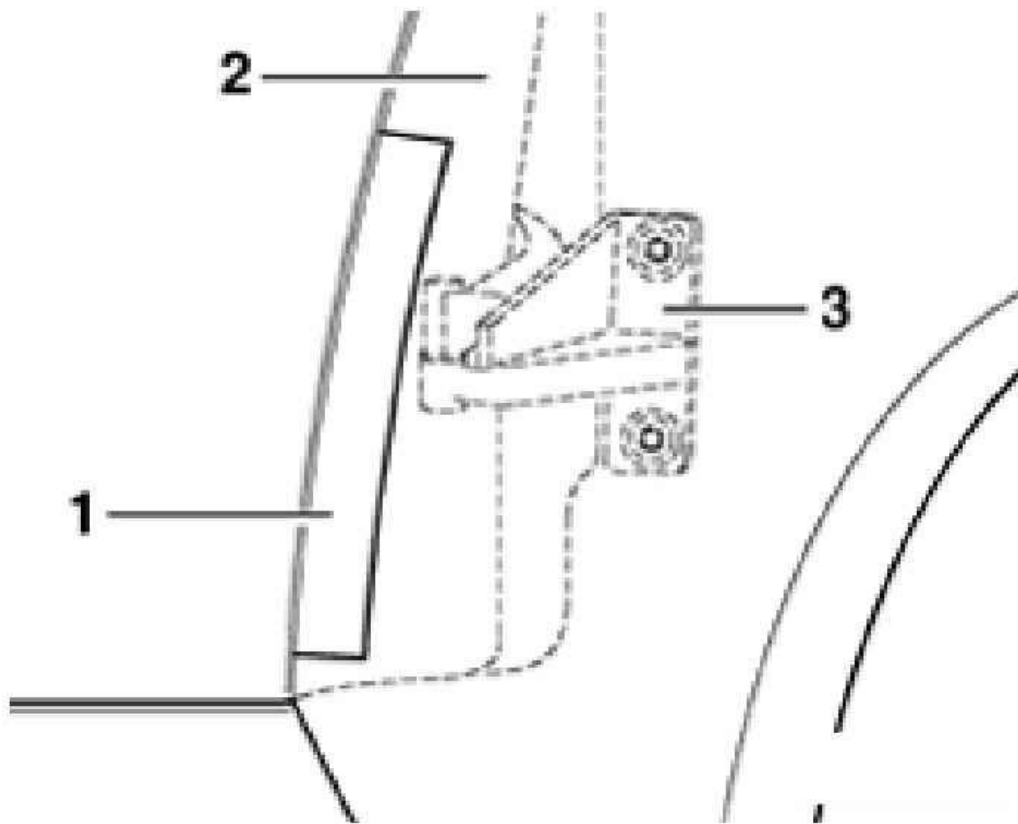
- Check wiring/connections to -N75-.
- Switch OFF ignition.
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03259124

Fig. 116: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and harness connector using Wiring diagram.



G03259125

Fig. 117: Identifying Wastegate Bypass Regulator Valve -N75- Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 1 + socket 28
- Terminal 2 + socket 15

From MY 2000

- Terminal 1 + socket 2
- Terminal 2 + socket 62
- Wire resistance: 1.5 ohm maximum

- Check wires for shorting to: one another, Ground and Battery +.
- Specification: INFINITY ohm
- Correct any open/short circuit as necessary.

If no open or short circuits exist:

- Replace Engine Control Module.
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Mass Air Flow (MAF) Sensor -G70-, checking

ECM uses MAF Sensor -G70- signal to calculate injection quantity and for regulating EGR. The smaller the -G70- signal; the smaller the quantity of injected fuel.

Special tools

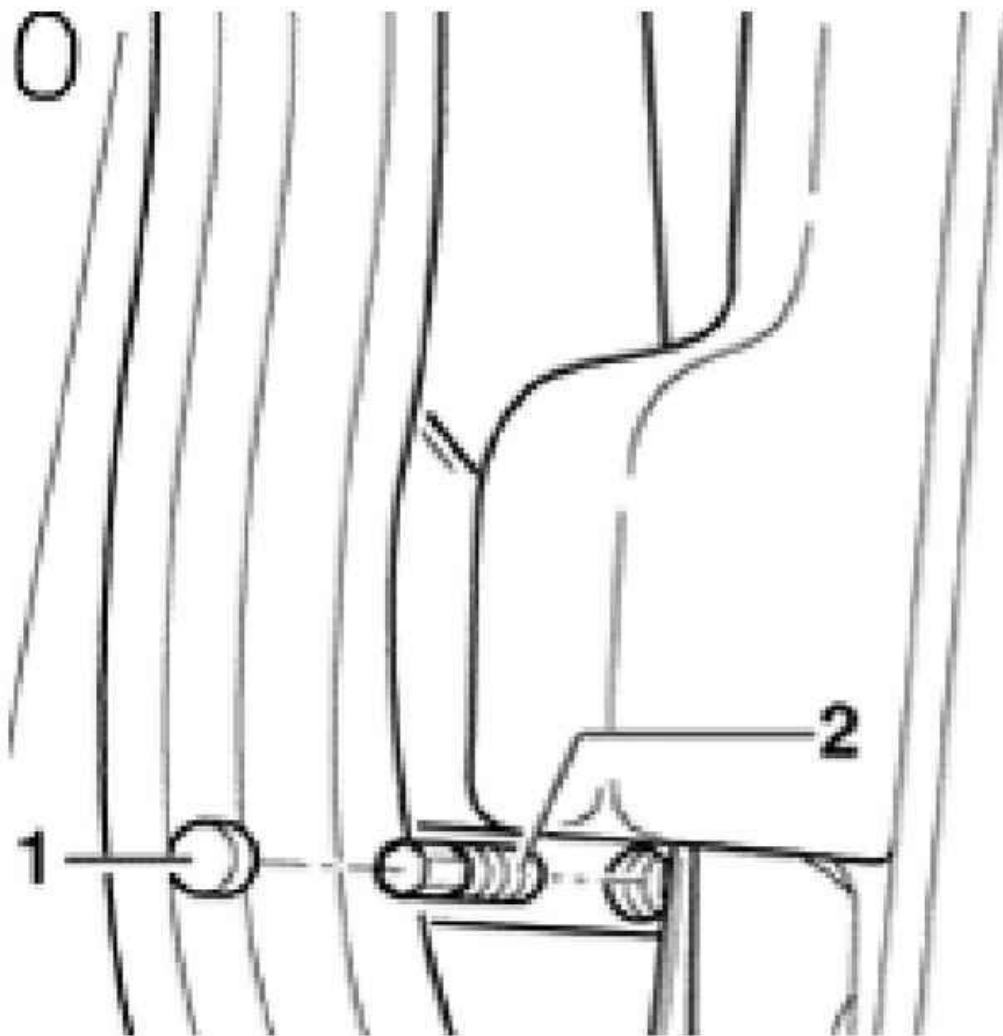
- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

WARNING: For safe operation, use a second technician to operate test equipment and take readings from back seat, during test drive.

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** and start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):



G03259126

Fig. 118: Scan Tool Display - Mass Air Flow Sensor (1 Of 7)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

Select function XX

G03450579

Fig. 119: Scan Tool Display - Mass Air Flow Sensor (2 Of 7)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

Read measuring value block

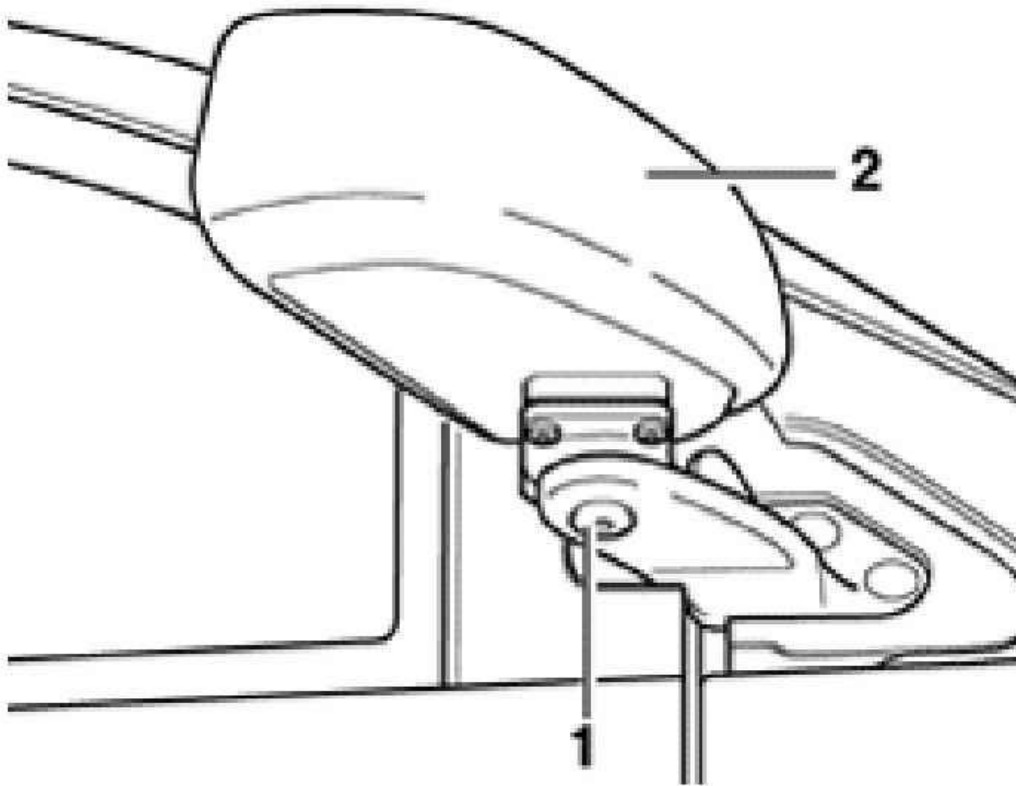
HELP

Input Display group number XXX

G03450580

Fig. 120: Scan Tool Display - Mass Air Flow Sensor (3 Of 7)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0-, -1- and -0- buttons to select "Display group 10".
- Observe display in Display zone 1.
- Specified Value: 200 to 450 mg/H



G03259129

Fig. 121: Scan Tool Display - Mass Air Flow Sensor (4 Of 7)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

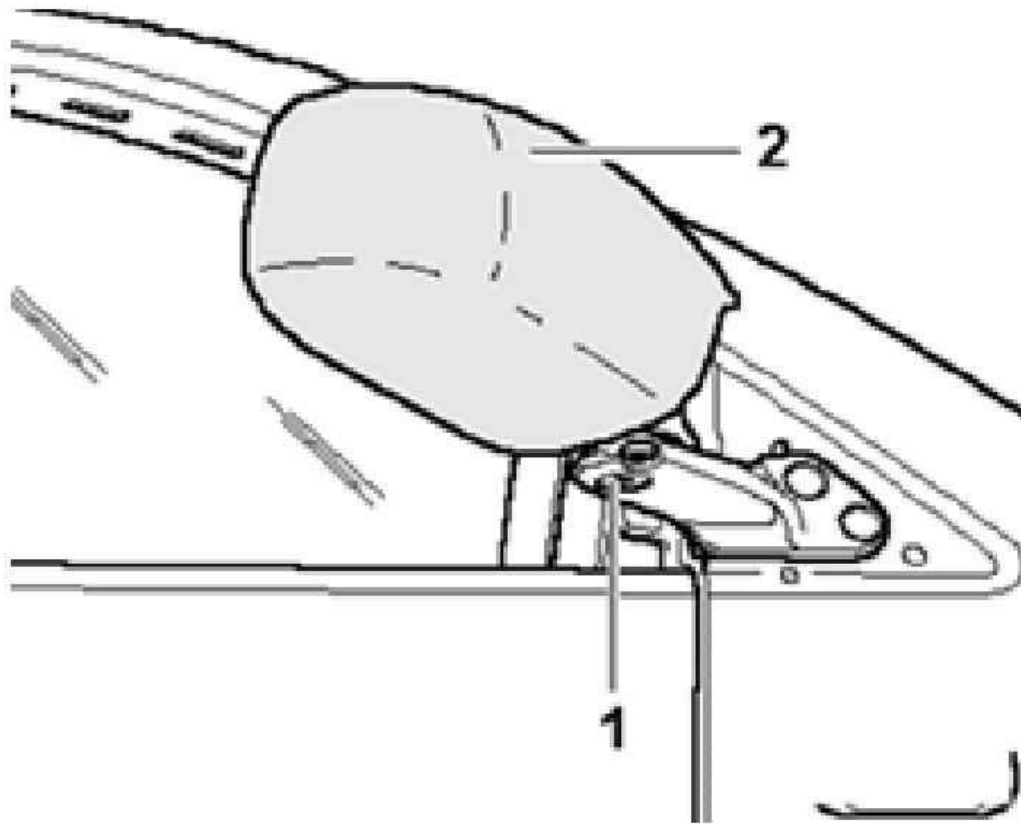
If specification not obtained:

- Check Exhaust Gas Recirculation system

See **EXHAUST GAS RECIRCULATION (EGR), CHECKING** .

If specification obtained:

- Accelerate vehicle in 3rd gear from about 1500 RPM under Wide Open Throttle (WOT).
- Press PRINT button on VAG1551 at approx. 3000 RPM.
- Specification in Display zone 4: 100% (Throttle position)

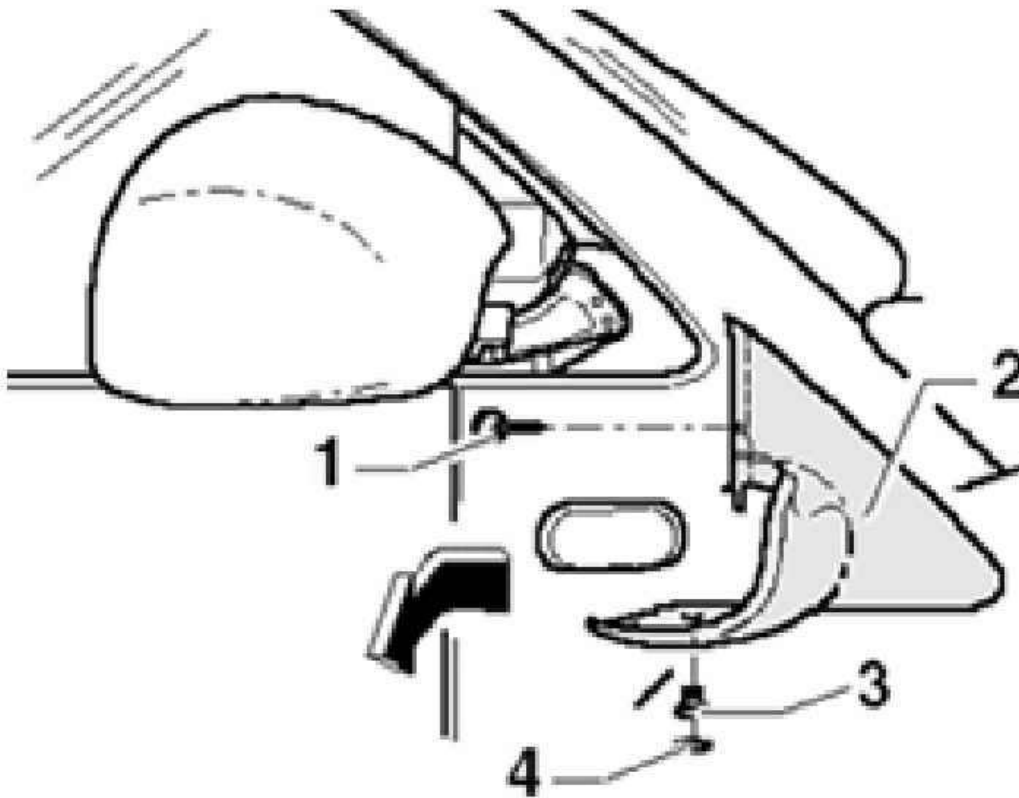


G03259130

Fig. 122: Scan Tool Display - Mass Air Flow Sensor (5 Of 7)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If specification not obtained:

- Repeat test and accelerate vehicle under Wide Open Throttle.
- Specification in Display zone 1: above 800 mg/H



G03259131

Fig. 123: Scan Tool Display - Mass Air Flow Sensor (6 Of 7)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If specification not obtained:

- Replace Mass Air Flow Sensor -G70-.
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If 550 mg/H is constantly displayed in zone 1.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

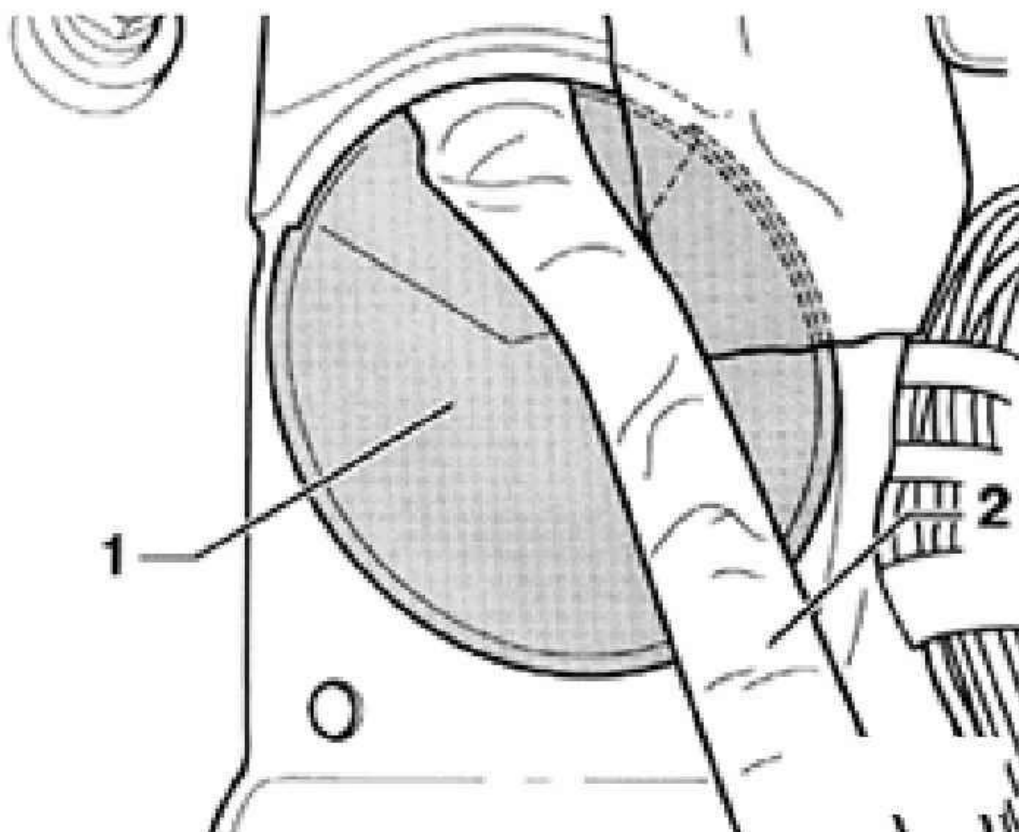
Select function XX

G03450584

Fig. 124: Scan Tool Display - Mass Air Flow Sensor (7 Of 7)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.
- Switch OFF ignition.
- Disconnect -G70- harness connector. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .
- Switch ON ignition.
- Switch multimeter to 20 Volt range.
- Measure -G70- voltage supply between the following connector terminals:



G03259133

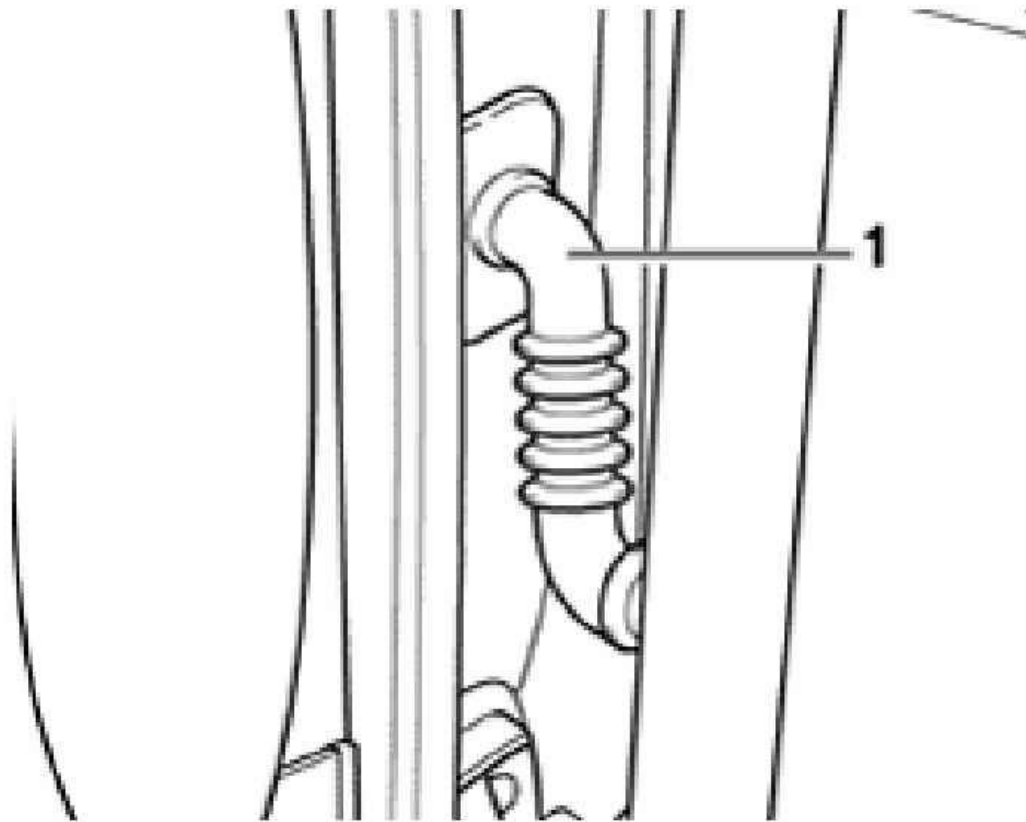
Fig. 125: Identifying MAF Sensor -G70- Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

MAF SENSOR TERMINAL SPECIFICATION CHART

Terminal: -G70-	Specification
2 + Ground	App. battery Voltage
2 + 3	App. battery Voltage
4 + Ground	Approx. 5 Volts
4 + 3	Approx. 5 Volts

If specifications not obtained:

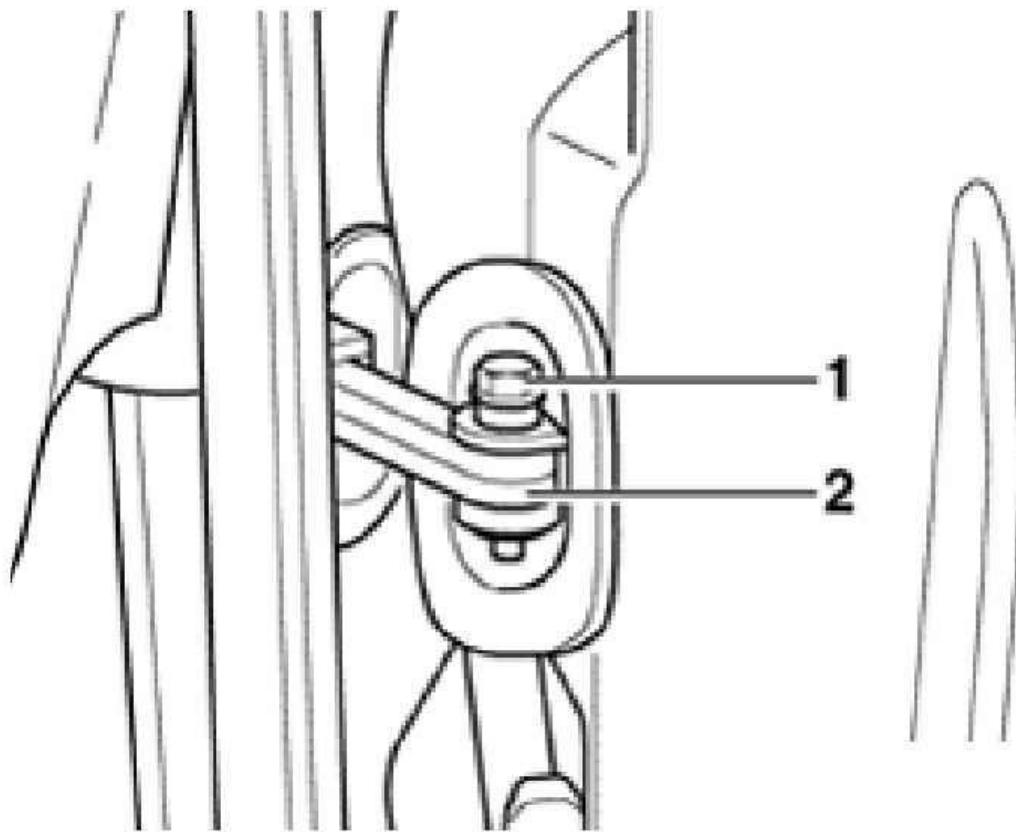
- Switch OFF ignition.
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03259134

Fig. 126: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and connections using Wiring diagram.



G03259135

Fig. 127: Identifying MAF Sensor -G70- Harness Connector Terminals
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 2 + socket 2 and 28
- Terminal 3 + socket 4
- Terminal 4 + socket 50
- Terminal 5 + socket 52

From MY 2000

- Terminal 2 + socket 1 and 2
- Terminal 3 + socket 49

- Terminal 4 + socket 30
- Terminal 5 + socket 68
- Wire resistance: 1.5 ohm maximum
- Check wires for short to one another, to Ground and to Battery +
- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

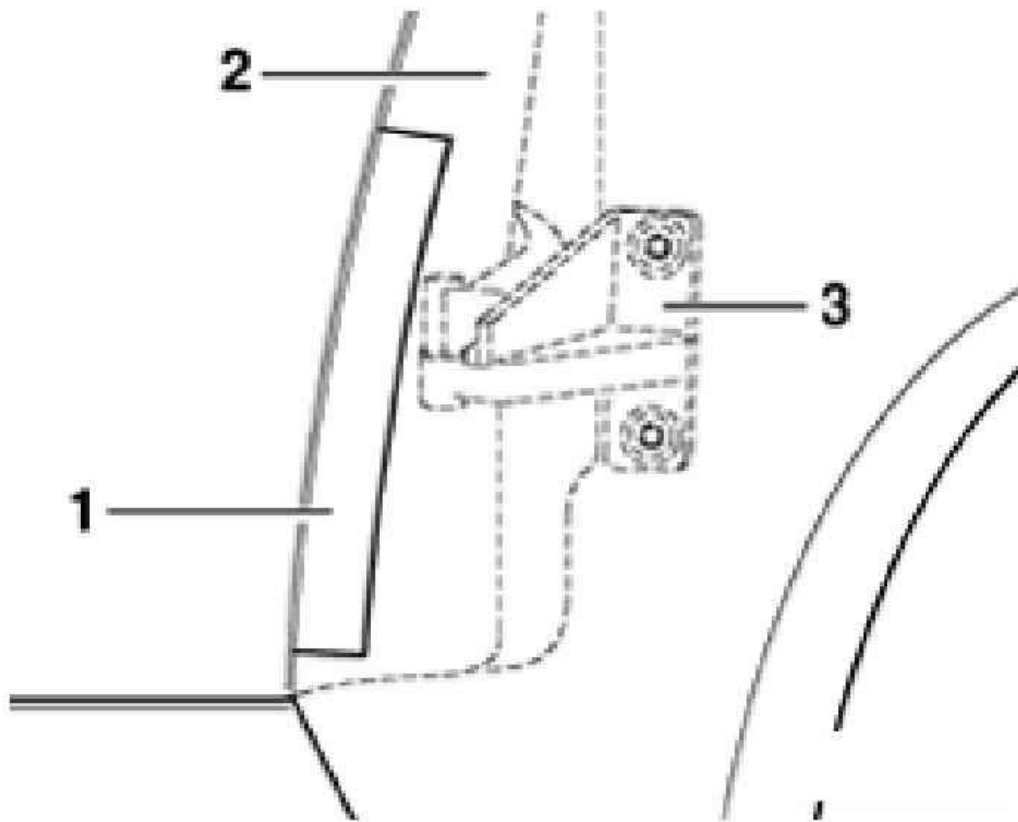
If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Change-over valve for intake manifold flap -N239-, checking

Special tools

- VAG1390 Hand vacuum pump



G03259136

Fig. 128: Identifying Special Tool VAG 1390 Hand Vacuum Pump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Function, checking

- Start engine and let idle.
- Switch OFF ignition.
- Observe position of lever on intake manifold change-over flap (using 2nd technician)

- Intake manifold change-over flap must (after switching OFF ignition) close back and after approx. 3 seconds re-open.

If change-over does not occur, perform following checks:

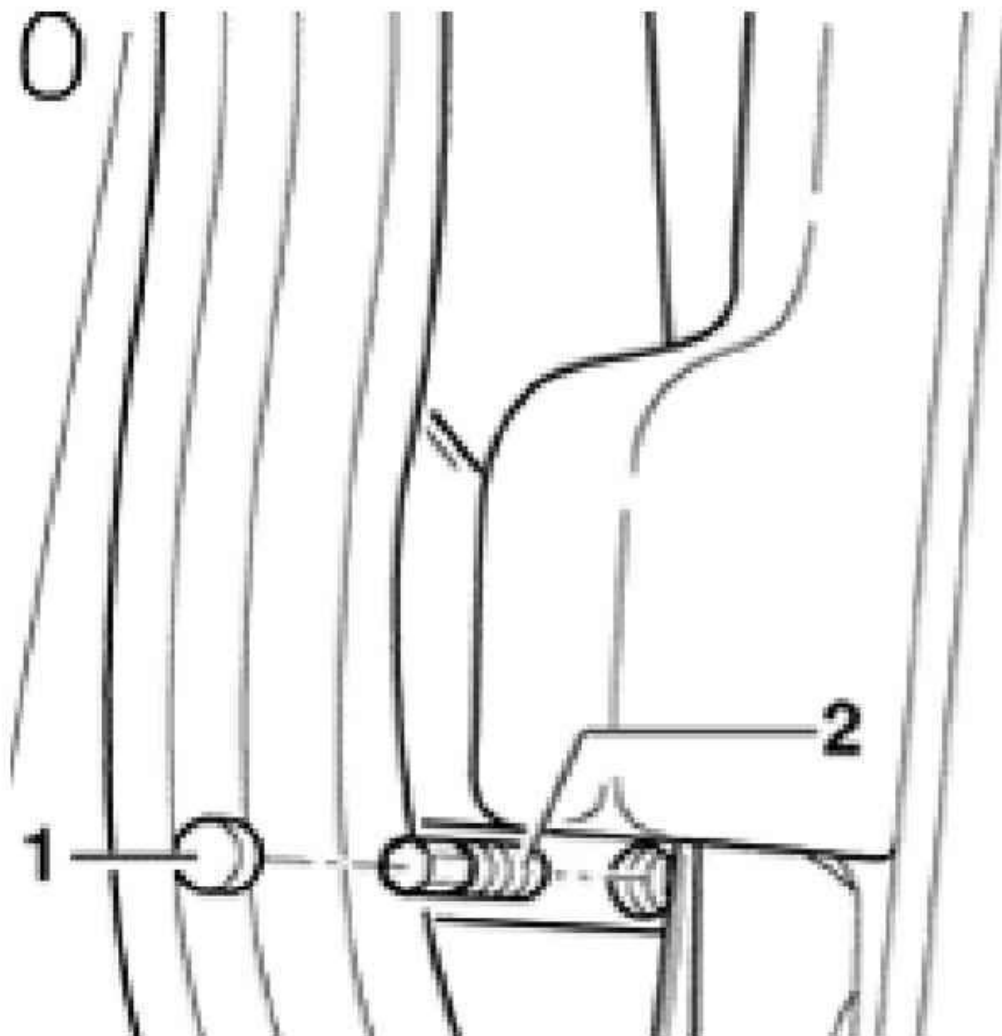
- Check intake manifold change-over flap mechanics for freedom of movement by manually operating the rods by hand.
- Check vacuum function of positioning actuator using VAG1390 hand vacuum pump.
- Check vacuum lines for correct connection.

If mechanical components OK:

- Check Intake Manifold Change-over Valve - N239-.

Test sequence

- Disconnect -N239- harness connector.
- Measure resistance between -N239- terminals.



G03259137

Fig. 129: Measuring Resistance Between Change-Over Valve For Intake Manifold Flap -N239- Terminals

Courtesy of VOLKSWAGEN OF AMERICA, INC.

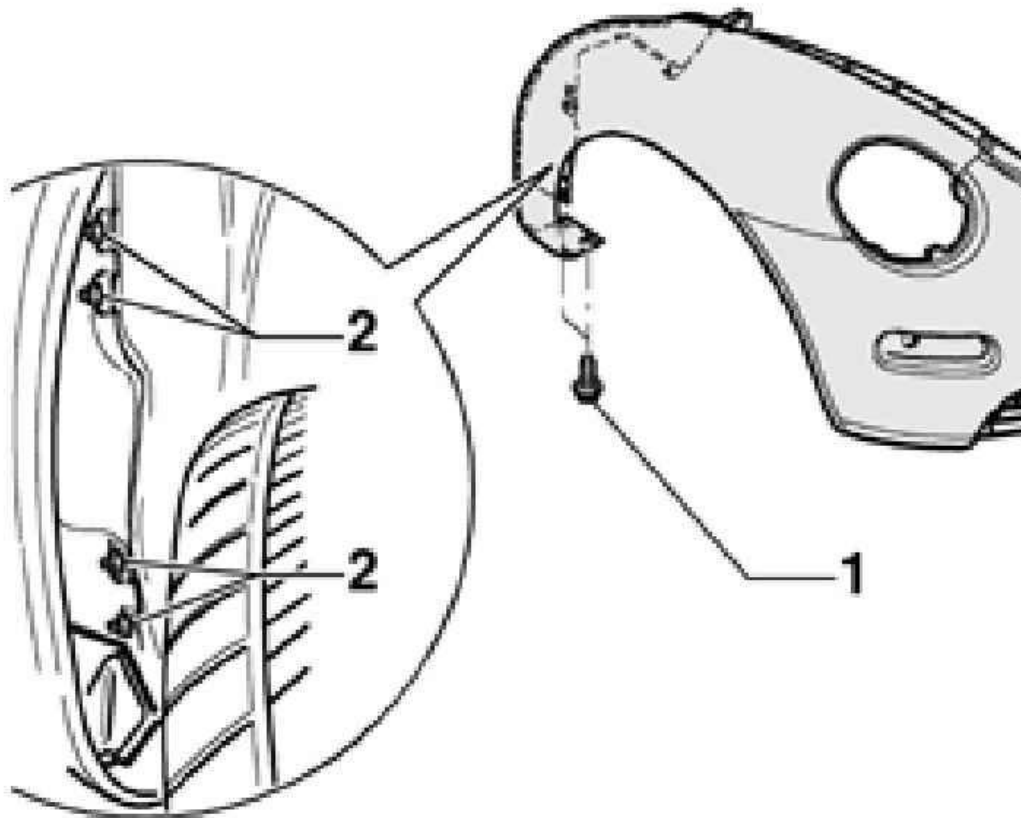
- Specification: 25 to 45 ohm

If specification not obtained:

- Replace Intake Manifold Change-over Valve -N239-.

If specification obtained:

- Switch Fluke 83 multimeter to 20 Volt range.
- Connect multimeter between terminals 1 and 2 of ECM connector using jumper wires from VW 1594 Adapter kit.



G03259138

Fig. 130: Identifying Change-Over Valve For Intake Manifold Flap -N239- Harness Connector Terminals

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Start engine and let idle.
- Specification: between 5 and 6 Volts
- Switch OFF ignition.

- Voltage value must rise to 11 to 15 Volts (battery Voltage) and after approx. 3 seconds fall to 0 Volts.

If Voltage values do not change as described:

- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.

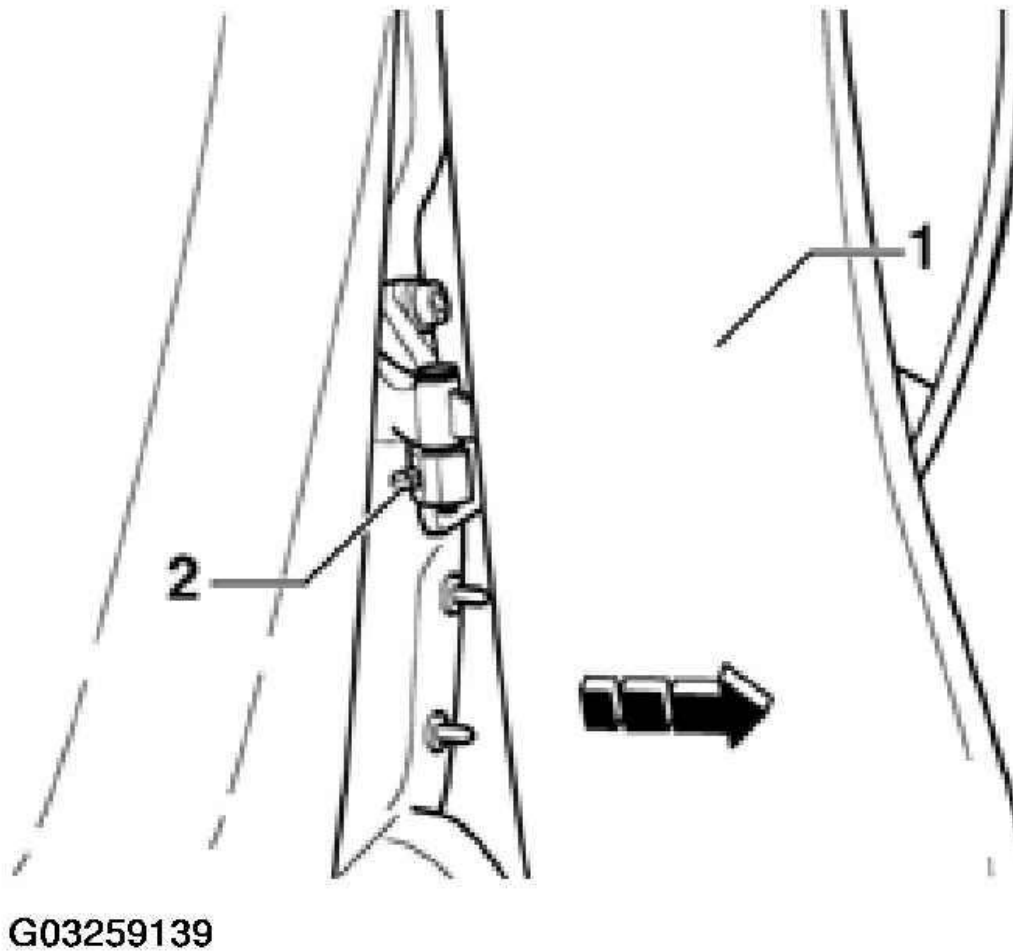
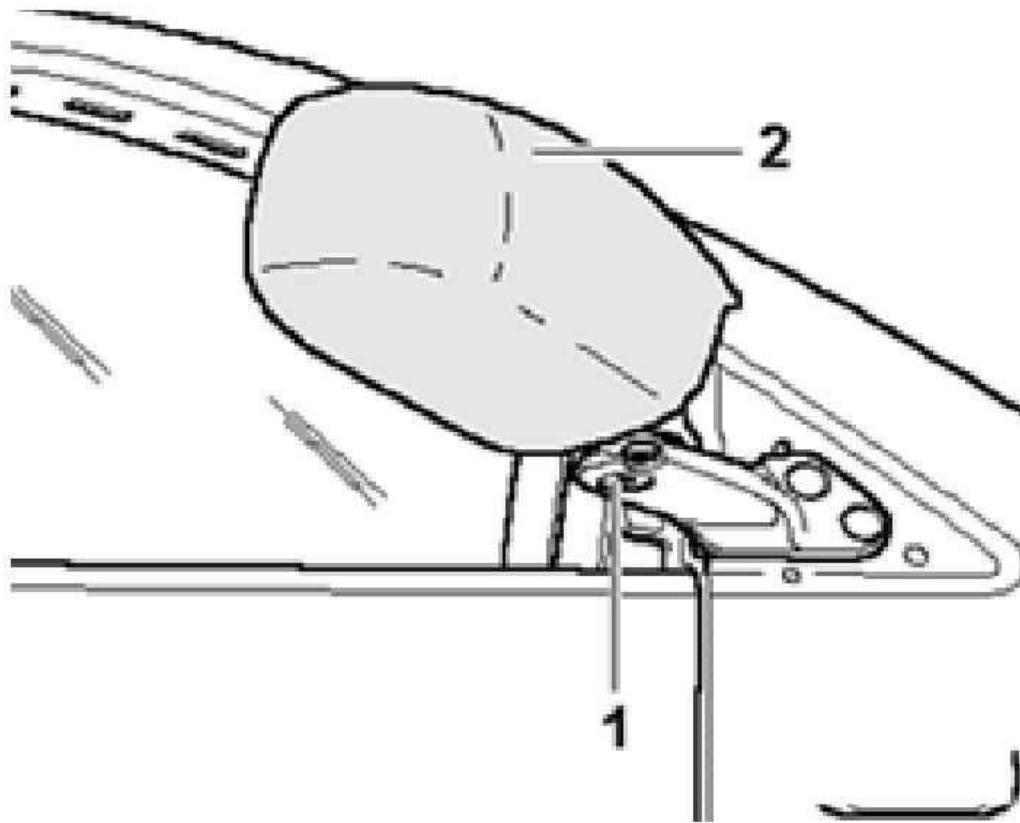


Fig. 131: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between Test Box and connector using Wiring diagram.



G03259140

Fig. 132: Identifying Change-Over Valve For Intake Manifold Flap -N239- Harness Connector Terminals

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Up to MY 1999

- Terminal 1 + socket 3
- Terminal 2 + sockets 2 and 28

From MY 2000

- Terminal 1 + socket 81
- Terminal 2 + sockets 1 and 2
- Wire resistance: 1.5 ohm maximum

- Check wires for shorting to: one another, Ground and Battery +.
- Specification: INFINITY ohm

If wiring OK:

- Replace Engine Control Module -J248-. See **Engine Control Module (ECM), replacing** .

DIESEL DIRECT FUEL INJECTION (DFI) ENGINE CONTROL MODULE (ECM) -J248-, REPLACING AND CODING

Engine Control Module (ECM), replacing

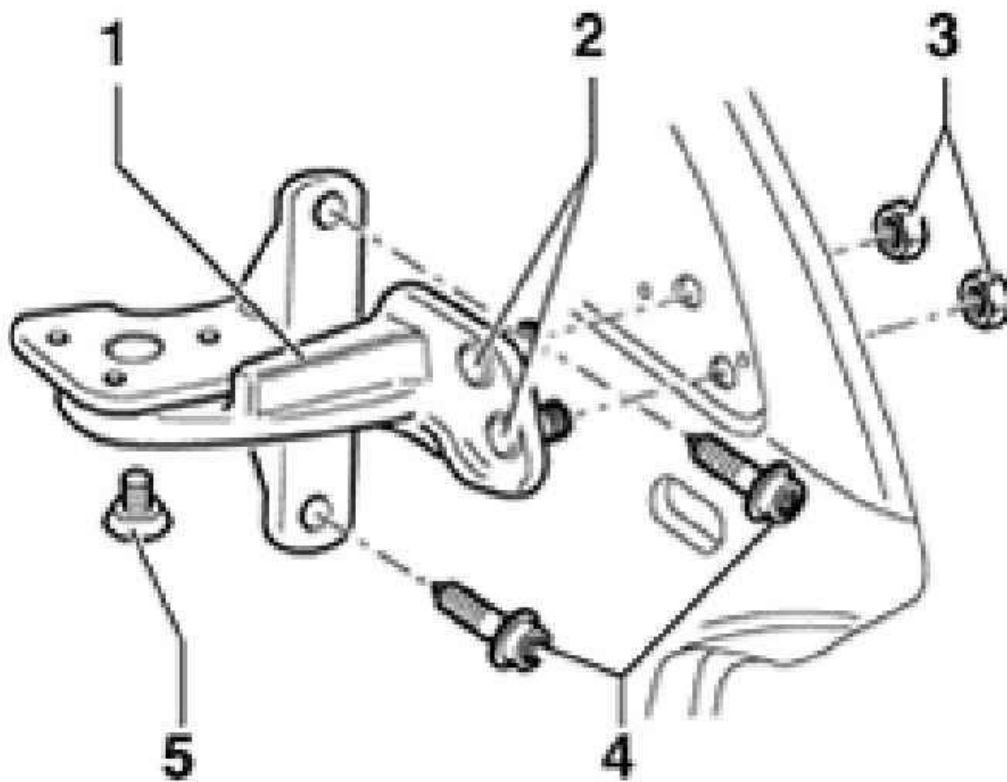
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable

Work sequence

- Print out the ECM identification (and thereby the previous ECM coding) as follows:
- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (I.D. example only):



1 - Door hinge.

2 - Threaded stud.

3 - Nut (20 Nm + 90°).

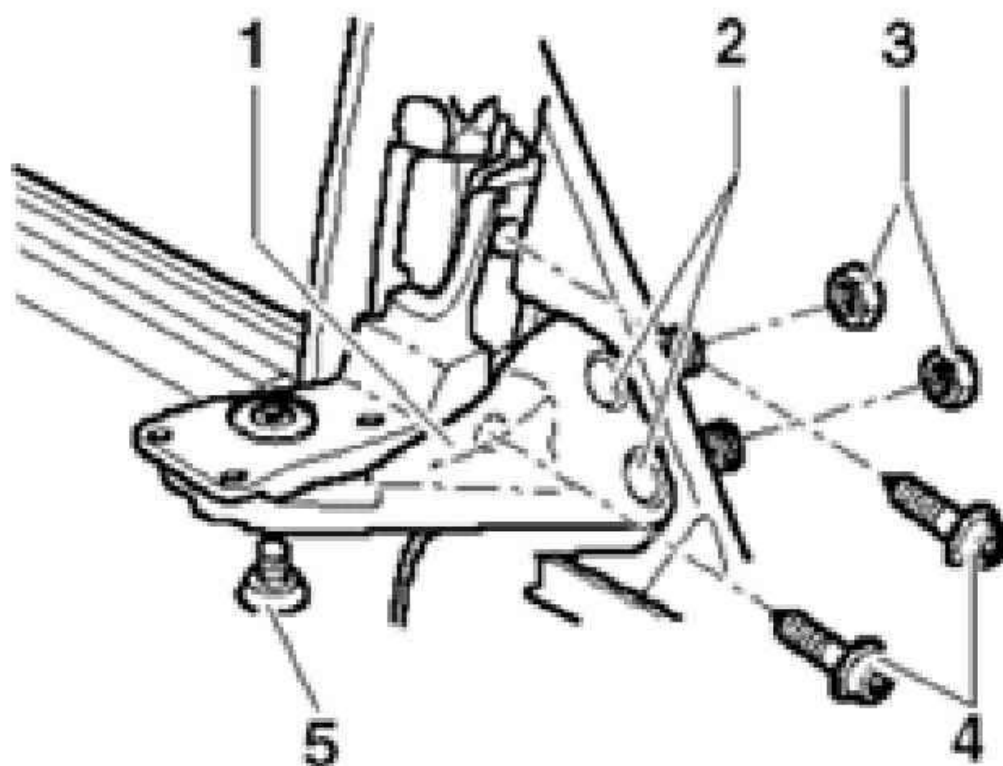
4 - Bolt (20 Nm + 90°).

5 - Bolt (27 Nm).

Fig. 133: Scan Tool Display - Replacing Engine Control Module (1 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press Scan Tool print button to print out ECM identification.
- Press --> button.

Display will appear as shown:



1 - Door hinge.

2 - Threaded stud.

3 - Nut (20 Nm $\pm$ 90°).

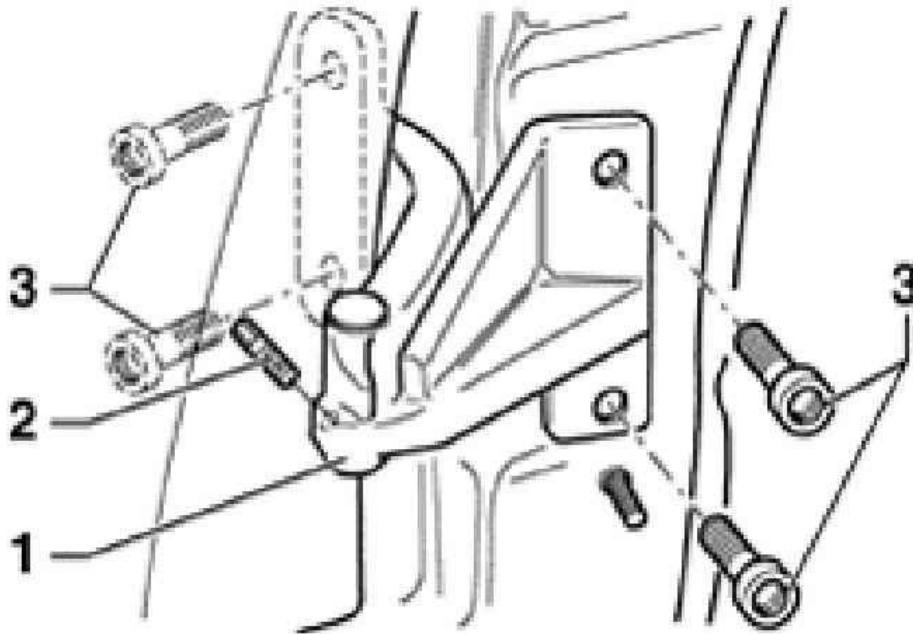
4 - Bolt (20 Nm $\pm$ 90°).

5 - Bolt (27 Nm).

Fig. 134: Scan Tool Display - Replacing Engine Control Module (2 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output"
- Press -Q- button to enter input.

Display will appear as shown:



1 - Door hinge.

2 - Grub screw (13 Nm).

3 - Bolt (20 Nm $\pm$ 90°).

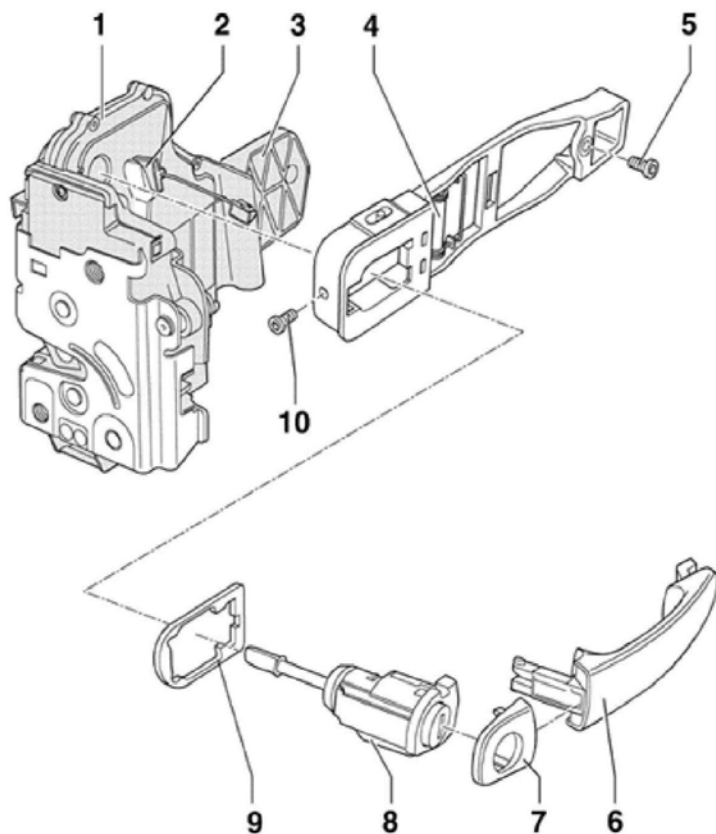
G03259143

Fig. 135: Scan Tool Display - Replacing Engine Control Module (3 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch OFF ignition.
- Remove inner covers on plenum.

See **INTERIOR TRIM** .

- Carefully pry off retainer bar with screwdriver (arrow).



- 1 - Door lock
- 2 - Cable
- 3 - Retaining bracket
- 4 - Bearing bracket
- 5 - Multi-point socket head bolt
- 6 - Door handle
- 7 - Cover cap
- 8 - Lock cylinder housing
- 9 - Backing piece
- 10 - Multi-point socket head bolt

G03259144

Fig. 136: Prying Off ECM Retainer Bar With Screwdriver
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Release harness connector from Engine Control Module (ECM) and pull off.

- Insert new ECM and press to the left.
- Tighten nut for ground wire (located in front of ECM) to 9 +/- 1 Nm (80 +/- 9 in. lb)
- Check previous ECM coding and coding of new ECM. See **ENGINE CONTROL MODULE (ECM), CODING** .
- Activate Cruise Control System. See **CRUISE CONTROL SYSTEM, ACTIVATING AND DEACTIVATING** .
- Check DTC memory of new ECM, erase if necessary. See **DTC MEMORY, CHECKING** .
- Adapt new control module to immobilizer. See **ANTI-THEFT IMMOBILIZER, ON BOARD DIAGNOSTIC (OBD)** .

Engine Control Module (ECM), coding

If appropriate code for vehicle is not displayed or if ECM has been replaced, code ECM as follows.

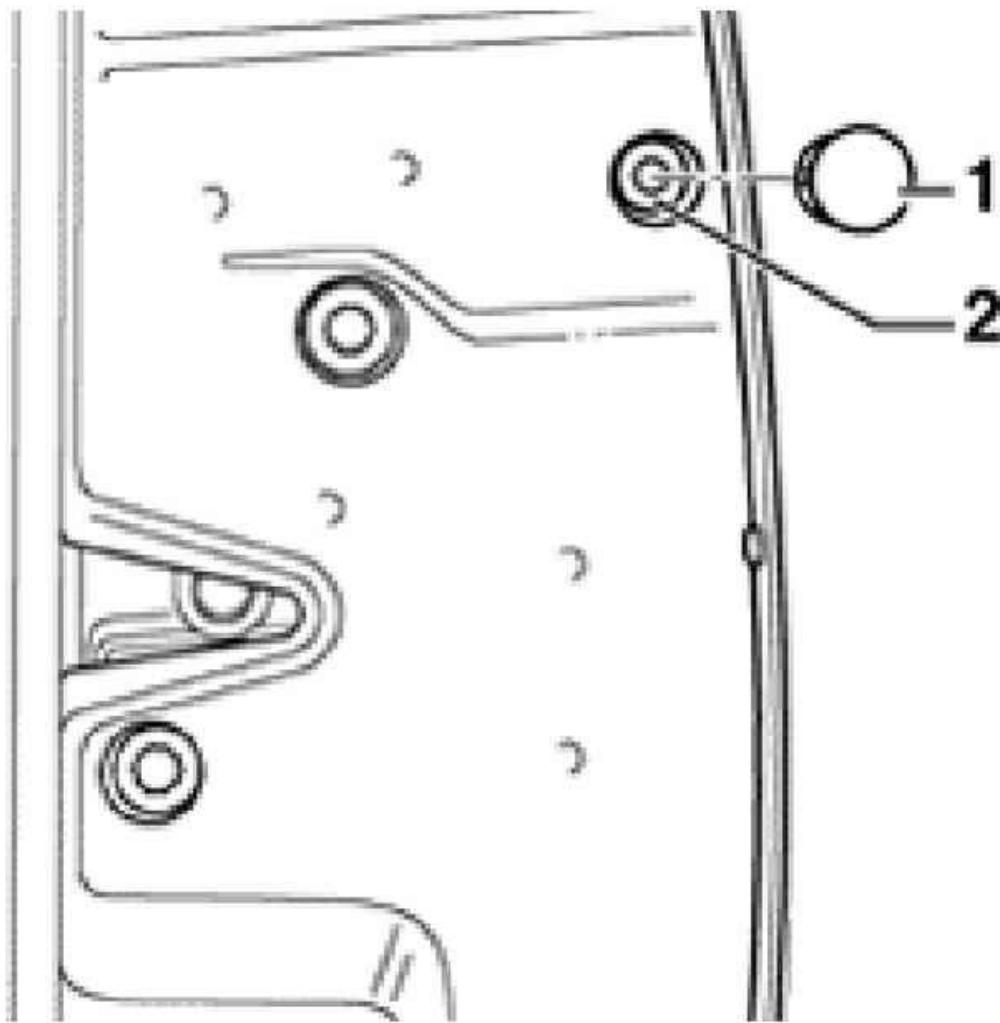
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable

Work sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Switch ON ignition but do not start engine.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (I.D. example only):

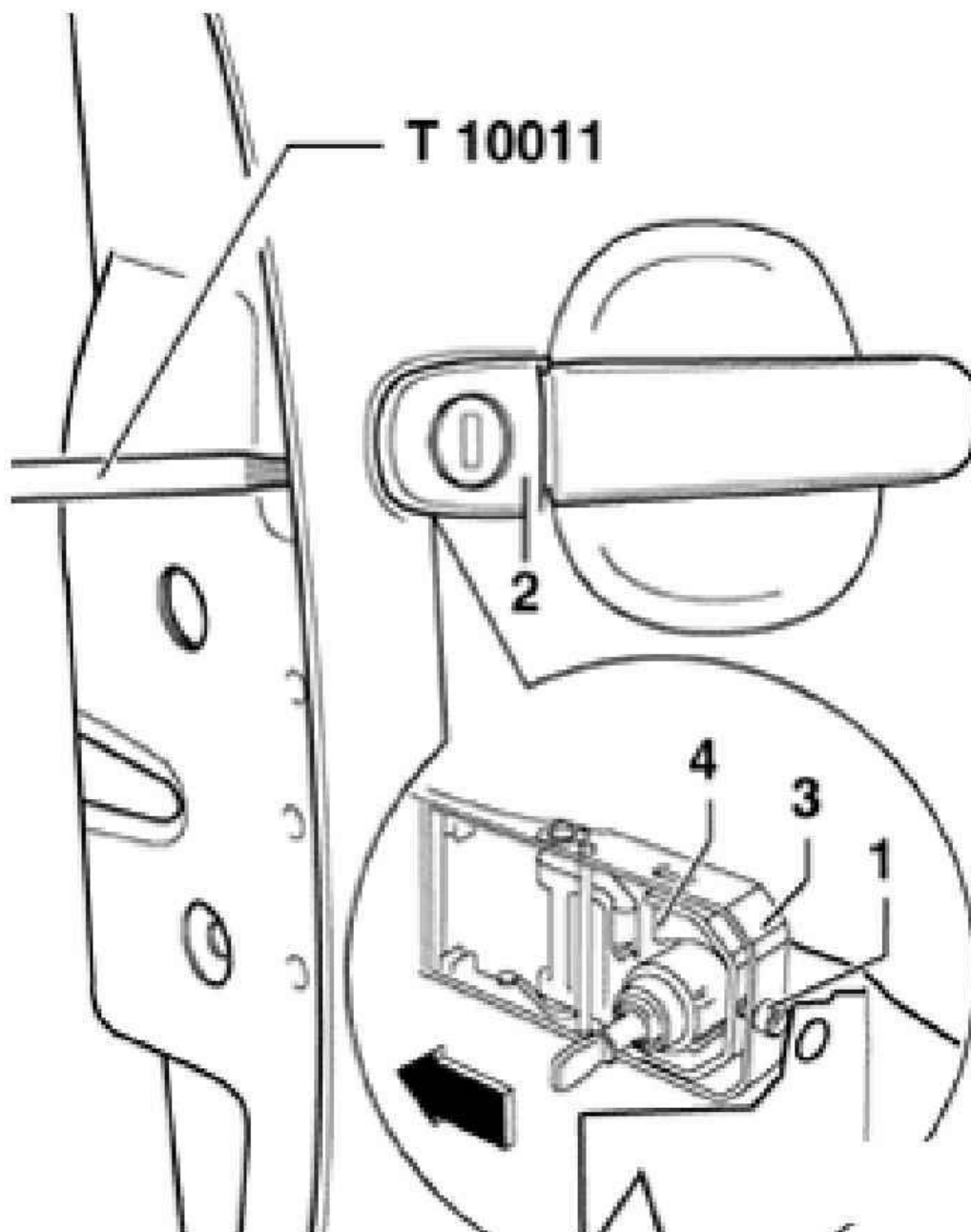


G03259145

Fig. 137: Scan Tool Display - Coding Engine Control Module (1 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

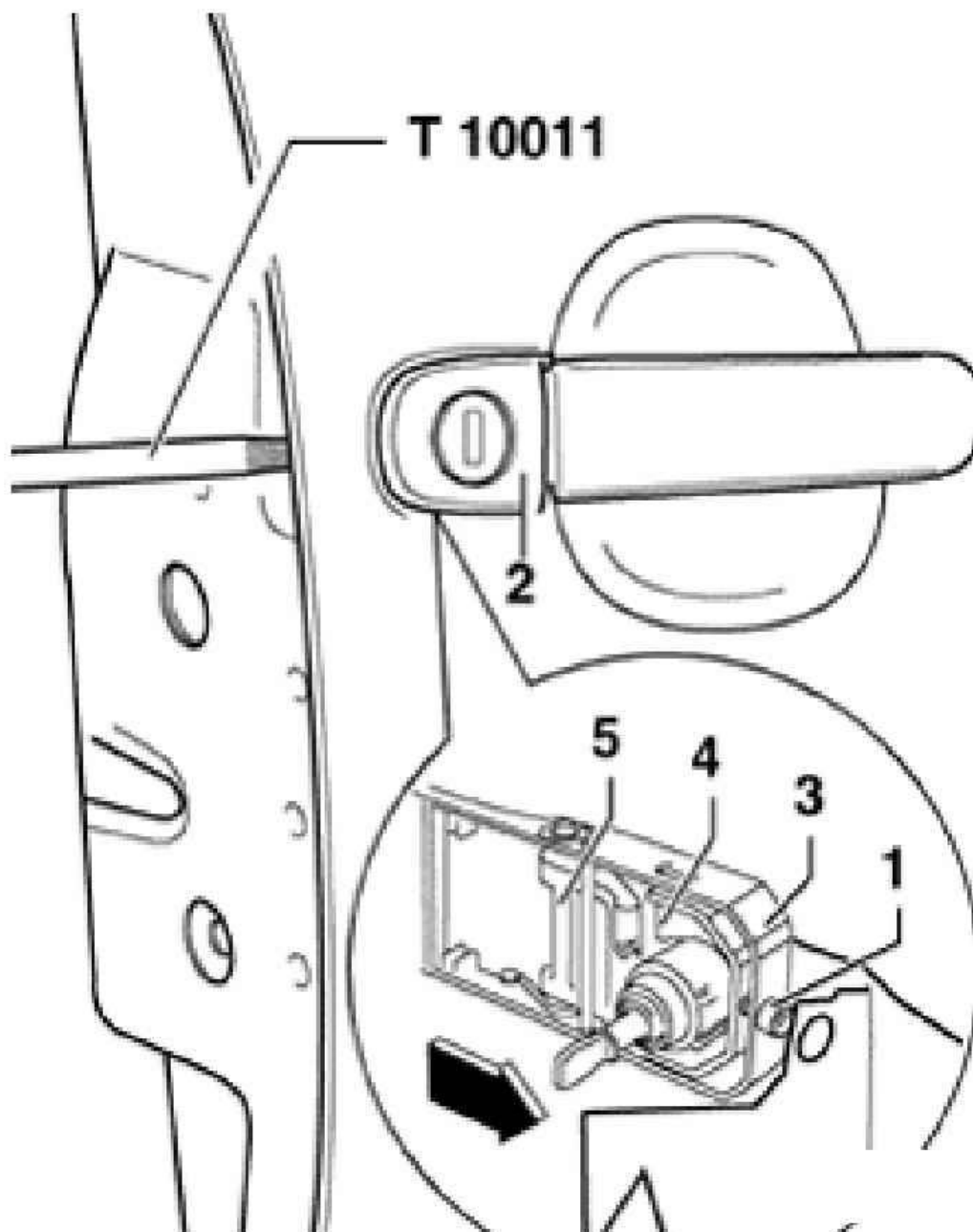


G03259146

Fig. 138: Scan Tool Display - Coding Engine Control Module (2 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -7- buttons to select Function 07: "Code control module".
- Press -Q- button to enter input.

Display will appear as shown:



G03259147

Fig. 139: Scan Tool Display - Coding Engine Control Module (3 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Enter appropriate code number for this vehicle. Coding tables. See **Engine control module coding, m.y. 1998-1999** and **Engine control module coding, from m.y. 2000** .

Engine control module coding, m.y. 1998-1999

TRANSMISSION CODING M.Y. 1998-1999 (EXCEPT ECM VERSION: 038 906 018 BD)

Transmission	ABS	Coding
Automatic	Yes	00001
Manual	Yes	00002
Automatic	No	00004

NOTE: The following code is valid for ECM version: 038 906 018 BD.

TRANSMISSION CODING M.Y. 1998-1999 (ONLY FOR ECM VERSION: 038 906 018 BD)

Transmission	ABS	Coding
Manual	No	00002

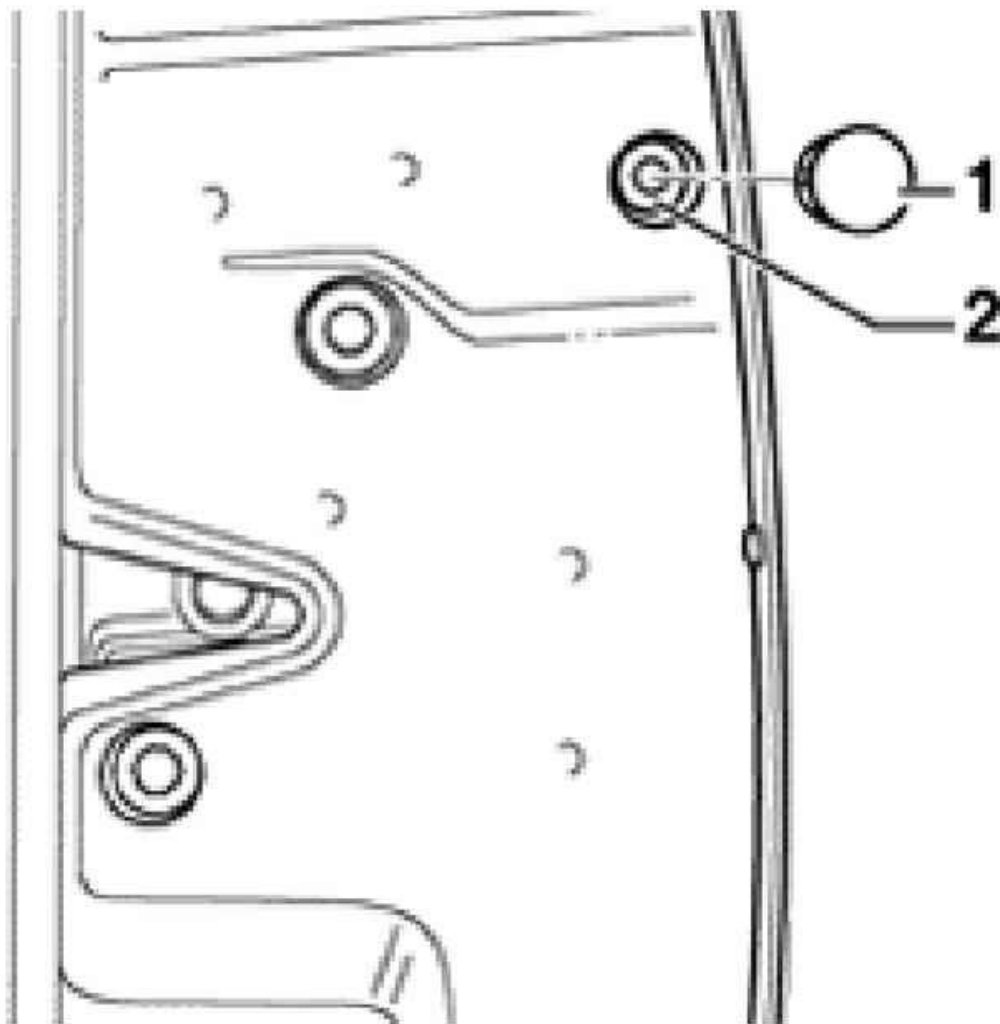
Engine control module coding, from m.y. 2000

Transmission Coding From M.Y. 2000

Transmission	ABS	Coding
Automatic	Yes	00001
Manual	Yes	00002
Manual	No	00002
Automatic	No	00004

- Press -Q- button to enter input.

Display will appear as shown (I.D. example only):



G03259148

Fig. 140: Scan Tool Display - Coding ECM From M.Y. 2000
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch ignition OFF and then ON again.

NOTE: Entered coding is activated by switching ignition OFF and then ON again. If, after entering correct code, ignition is NOT switched OFF and ON again, malfunction: "Control Module incorrectly coded" will become stored in DTC memory and must be erased.

- Erase DTC memory. See **DTC MEMORY, CHECKING** .
- Set readiness code. See **READINESS CODE, SETTING** .

CRUISE CONTROL SYSTEM, CHECKING, ACTIVATING AND DEACTIVATING

Cruise control system, checking

Cruise Control System, apart from control switches, has no components of its own. All functions are provided by the Fuel injection system.

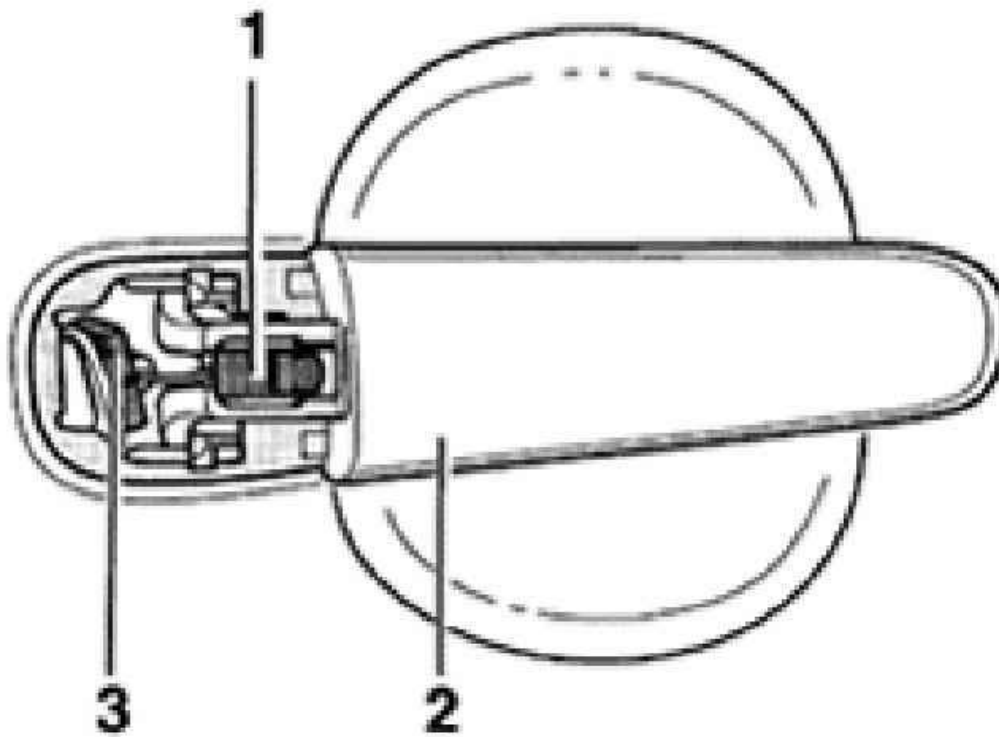
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):

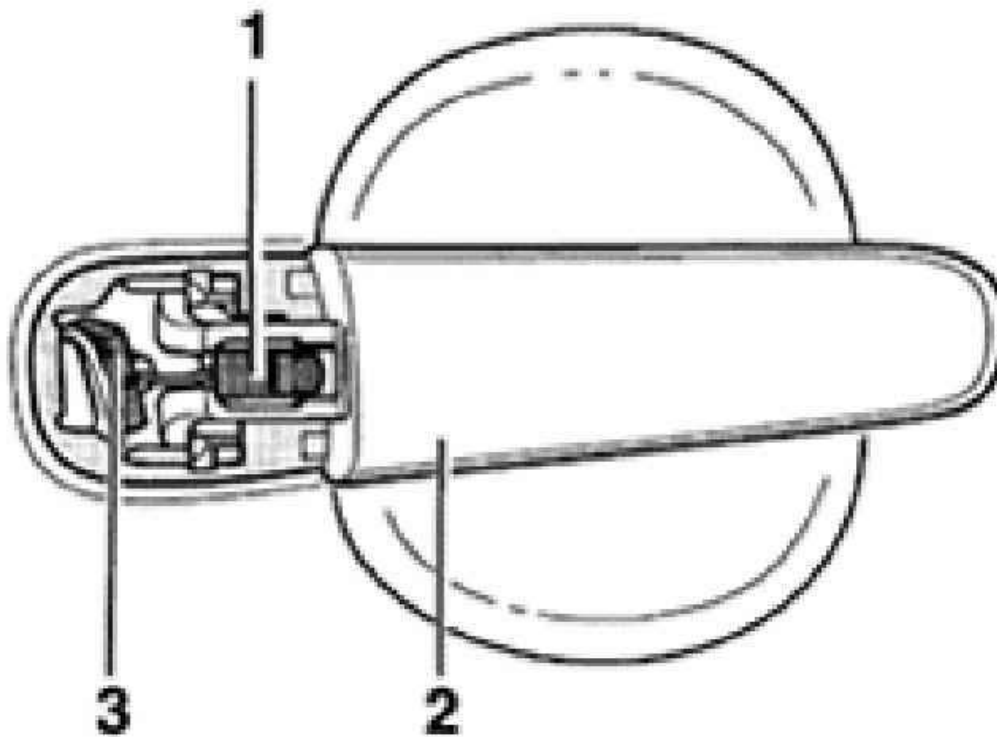


G03259149

Fig. 141: Scan Tool Display - Checking Cruise Control System (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

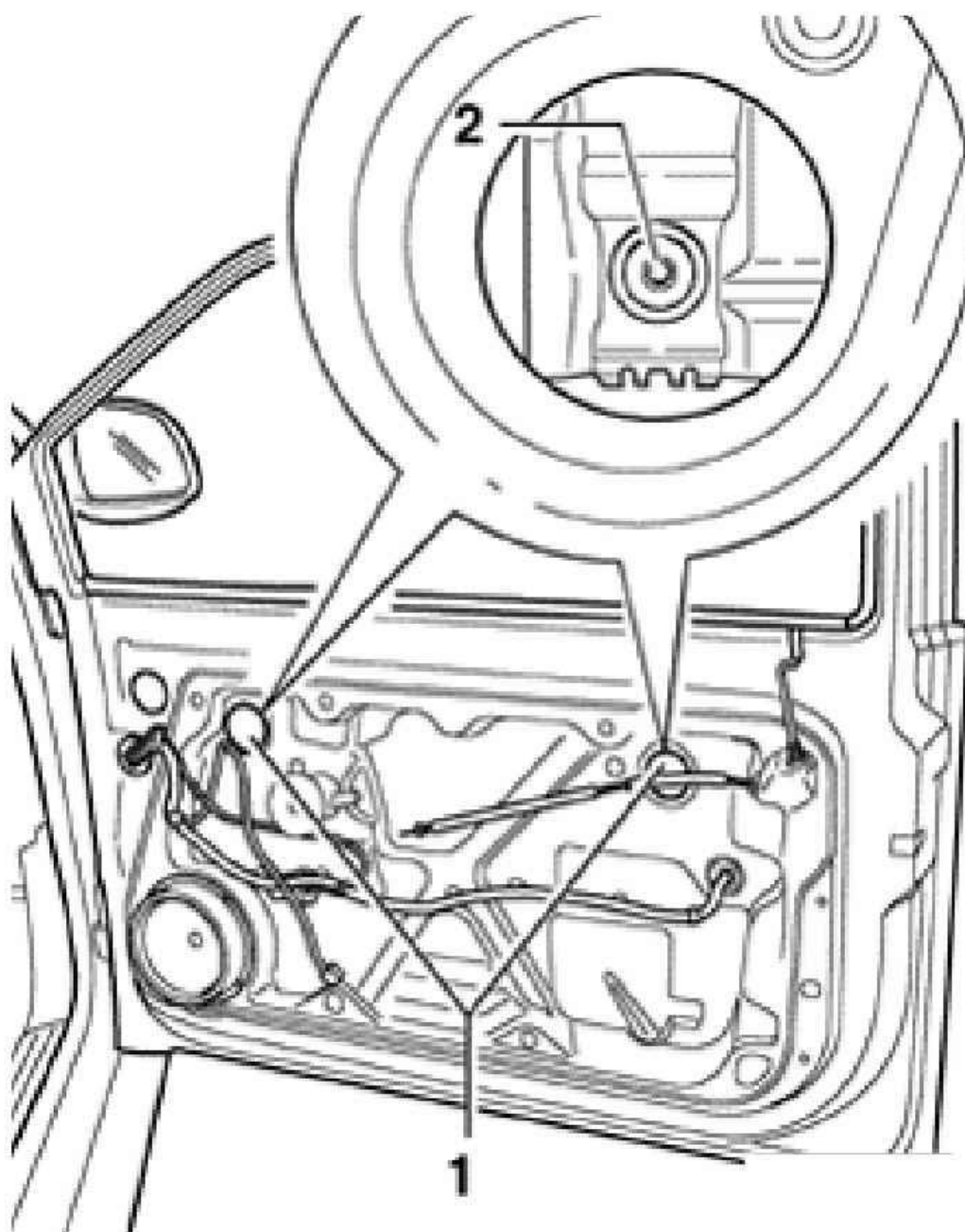


G03259150

Fig. 142: Scan Tool Display - Checking Cruise Control System (2 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

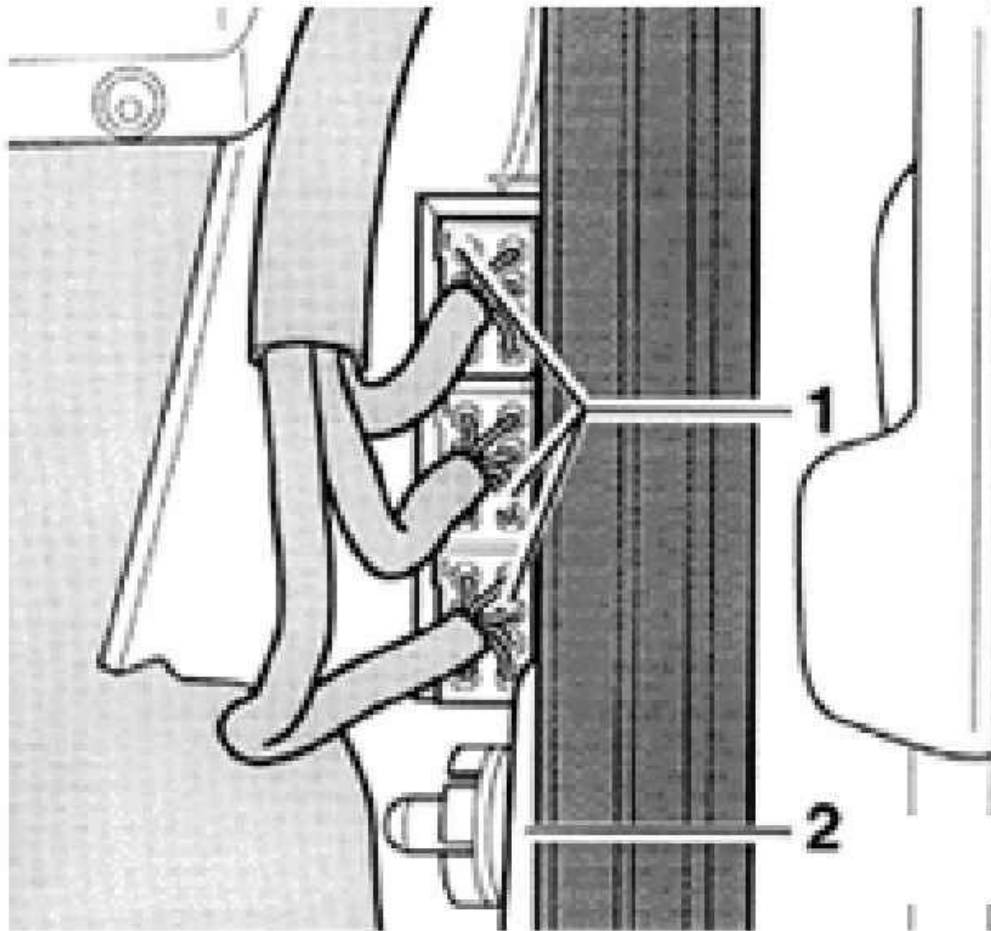


G03259151

Fig. 143: Scan Tool Display - Checking Cruise Control System (3 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0-, -0- and -6- to select "Display group 6".
- Press -Q- button to enter input.
- Observe display in Display zone 4.

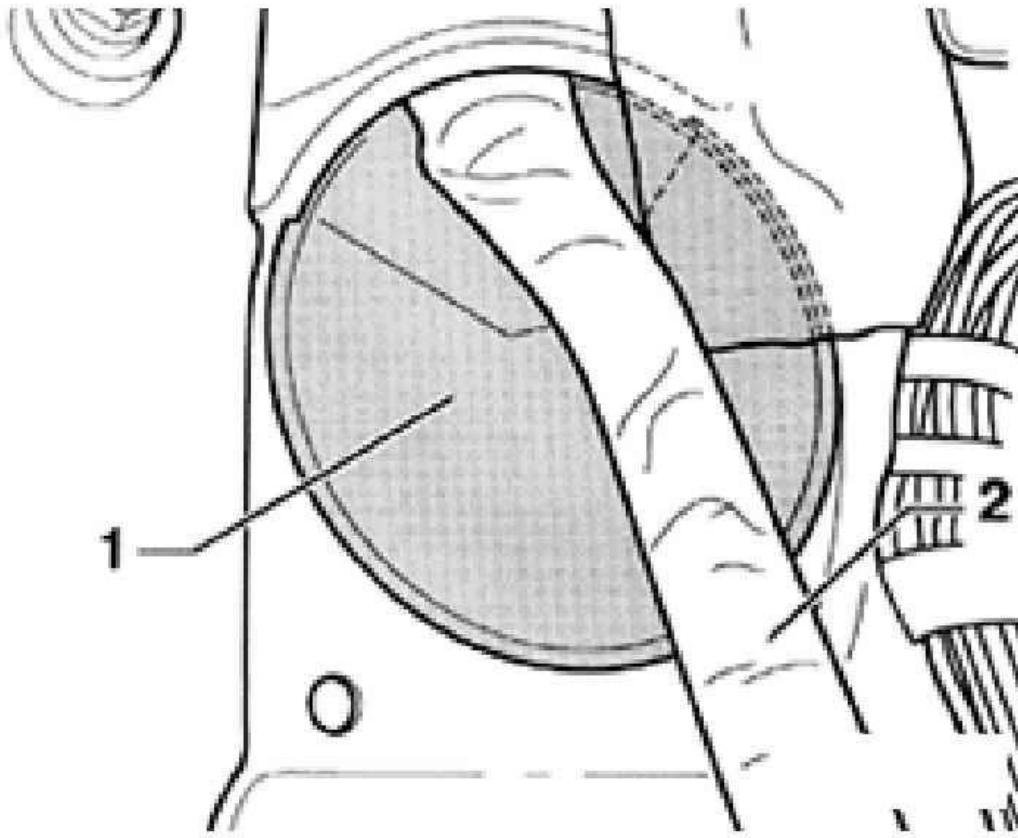
Specification: 0



G03259152

Fig. 144: Scan Tool Display - Checking Cruise Control System (4 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If 255 is displayed in zone 4:



G03259153

Fig. 145: Scan Tool Display - Checking Cruise Control System (5 Of 5)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Activate Cruise Control System. See **CRUISE CONTROL SYSTEM, ACTIVATING AND DEACTIVATING** .

Vehicles with automatic transmission only

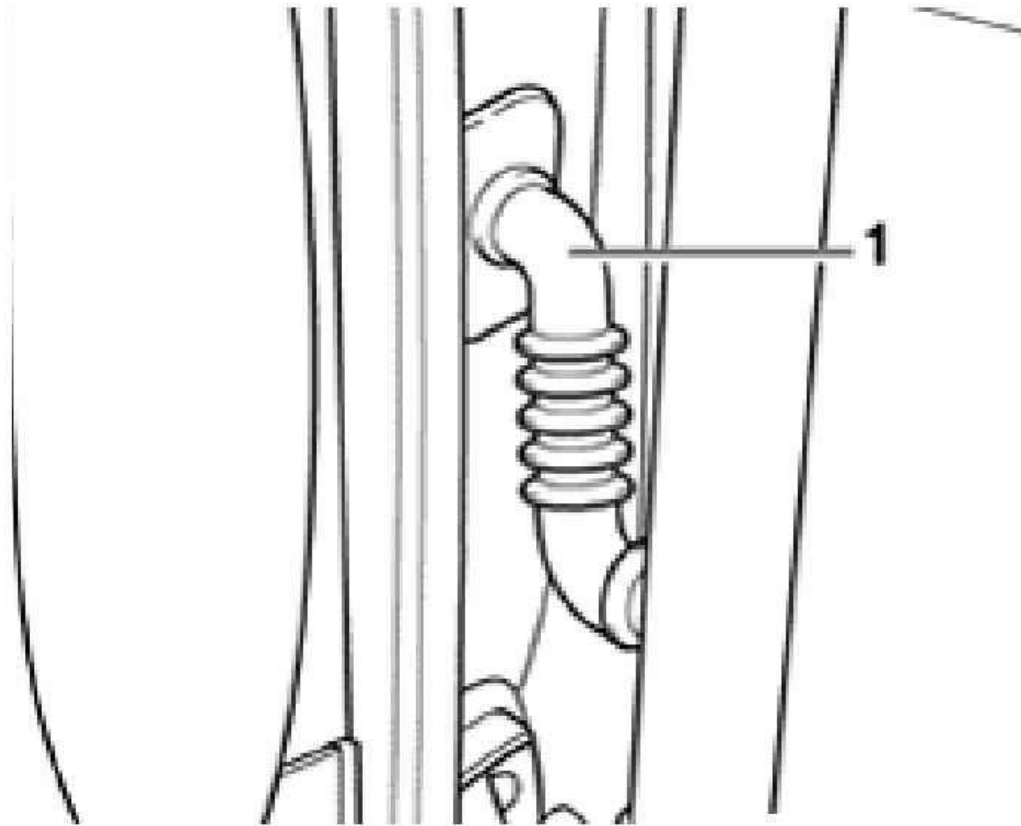
- Take a test drive where vehicle reaches at least 30 km/h (approx. 19 mph) one time.
- Switch OFF engine and leave selector lever in position 2, 3 or D.
- Apply hand brake.

NOTE:

- For vehicles with automatic transmissions; cruise control switch Voltage supply first becomes available when the vehicle exceeds a speed of 30 km/h (approx. 19 mph) with the Range selector lever in position 2, 3 or D.

- Voltage supply is also available during idle as long as a driving Range other than 1 or R is selected.

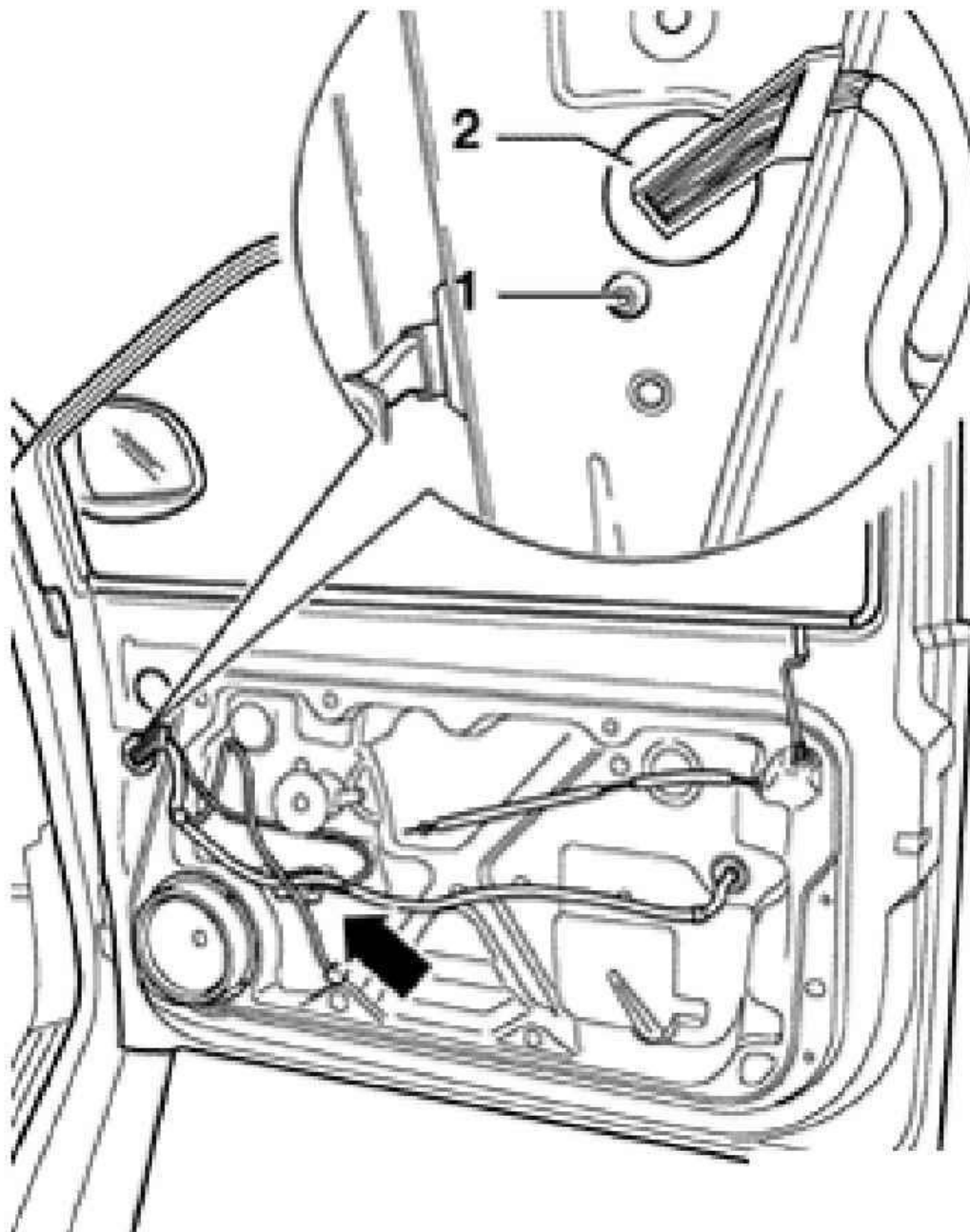
Check specification Display zone 3.



G03259154

Fig. 146: Scan Tool Display - Checking Cruise Control System (Automatic Transmission) (1 Of 2)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Checking requirements



G03259155

Fig. 147: Identifying Switch A & B
Courtesy of VOLKSWAGEN OF AMERICA, INC.

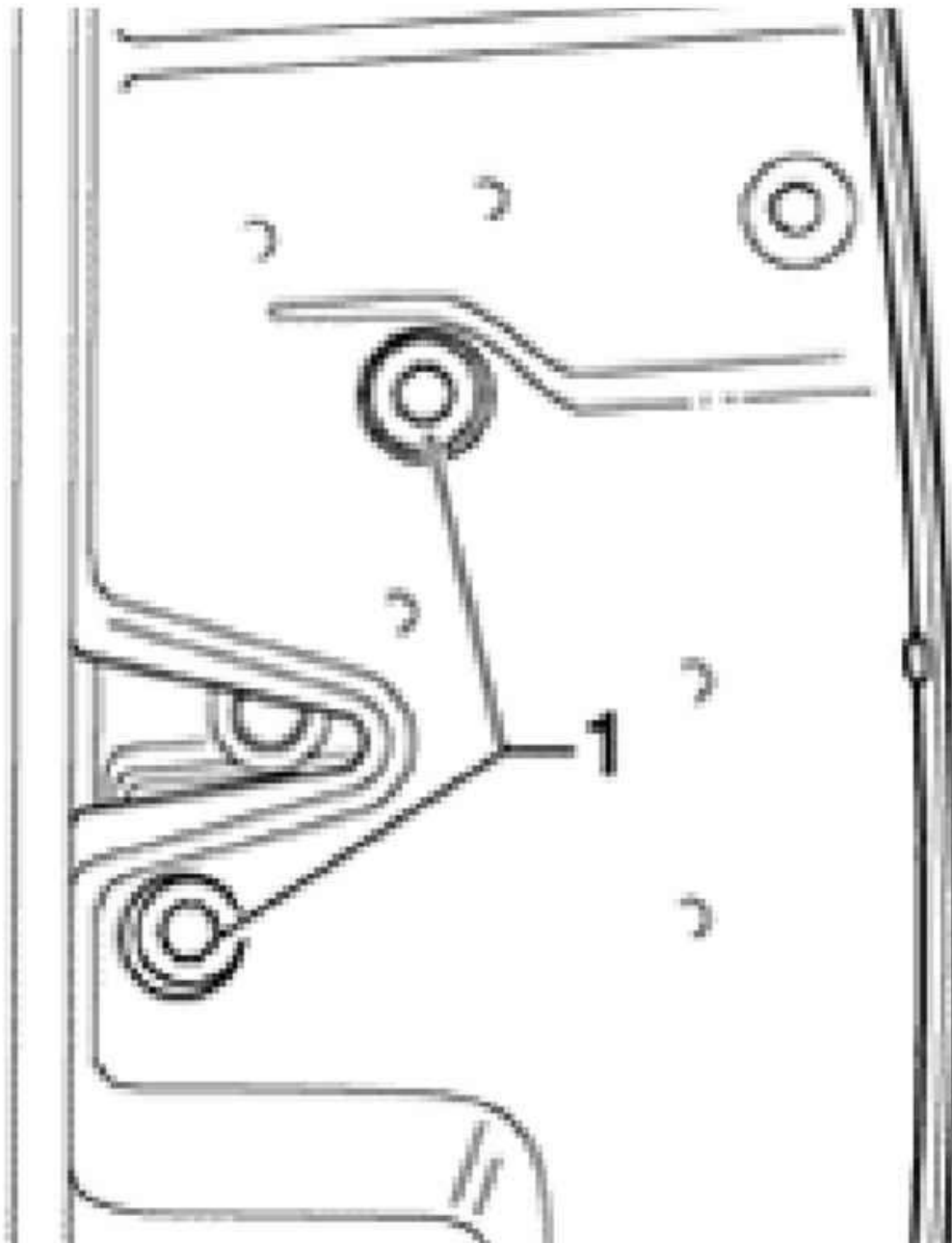
CRUISE CONTROL SWITCH SPECIFICATIONS

Checking requirements	Display zone 3
Switch B engaged at "OFF"	000000
Switch B at "OFF" before switch point	000001
Switch B at "ON"	000011
Switch B at "RES"	001011
Switch A pressed	000111
Brake pedal depressed	010011
Clutch pedal depressed	100011

If specifications not obtained:

- Press --> button.

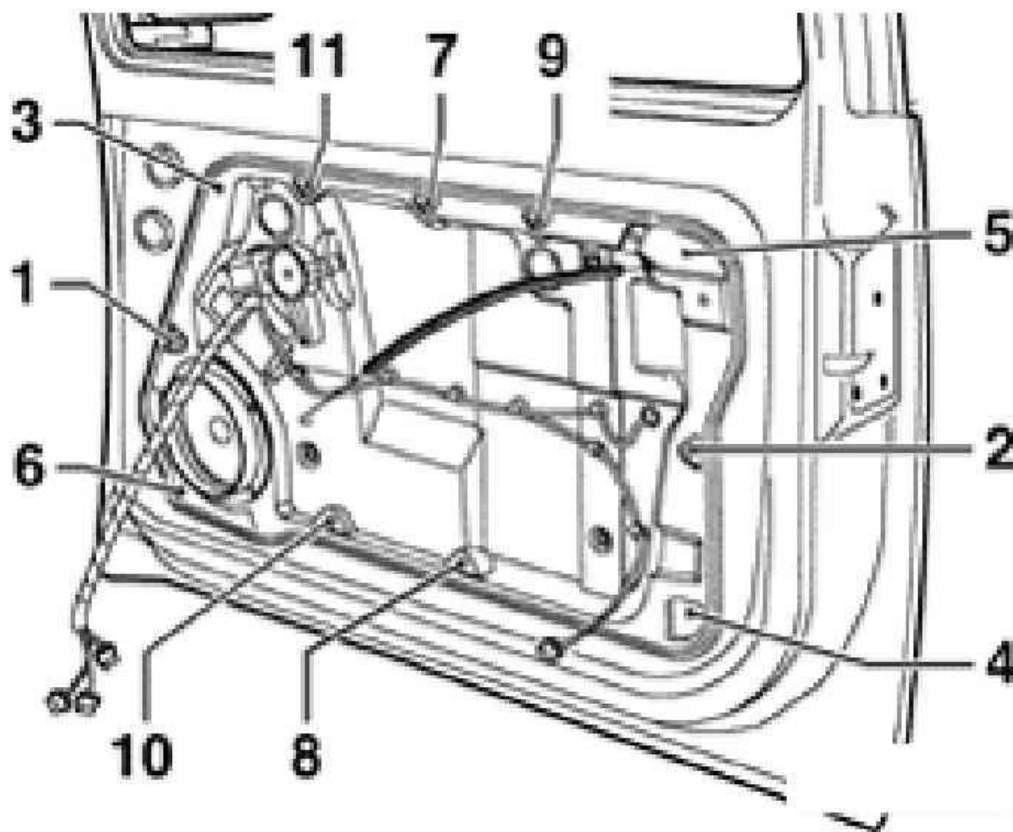
Display will appear as shown:



G03259156

Fig. 148: Scan Tool Display - Checking Cruise Control System (Automatic Transmission) (2 Of 2)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.
- Switch OFF ignition.
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03259157

Fig. 149: Connecting VAG 1598/22 Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

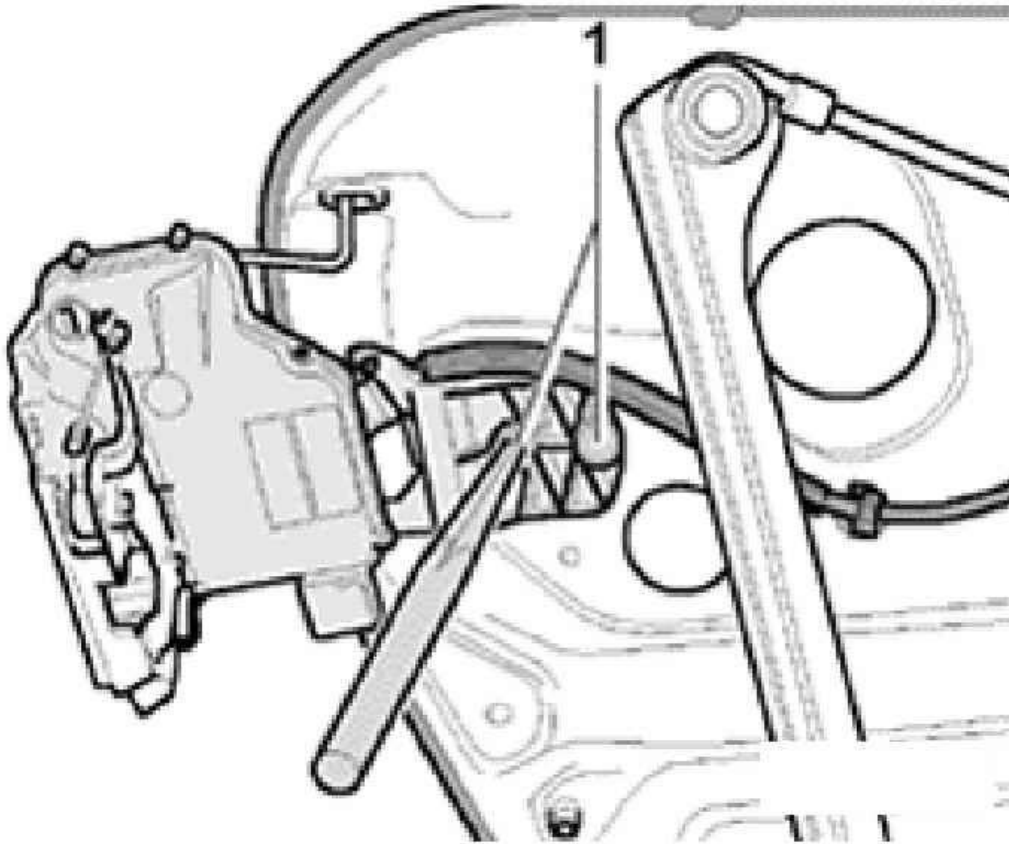
- Check wiring for open/short circuits between the Engine Control Module and the Cruise Control System switches using Wiring diagram.

See appropriate System Wiring Diagram article.

Cruise Control System, activating and deactivating

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Press buttons -0- and -1- to insert "Engine electronics" address word 01.

Indicated on display:

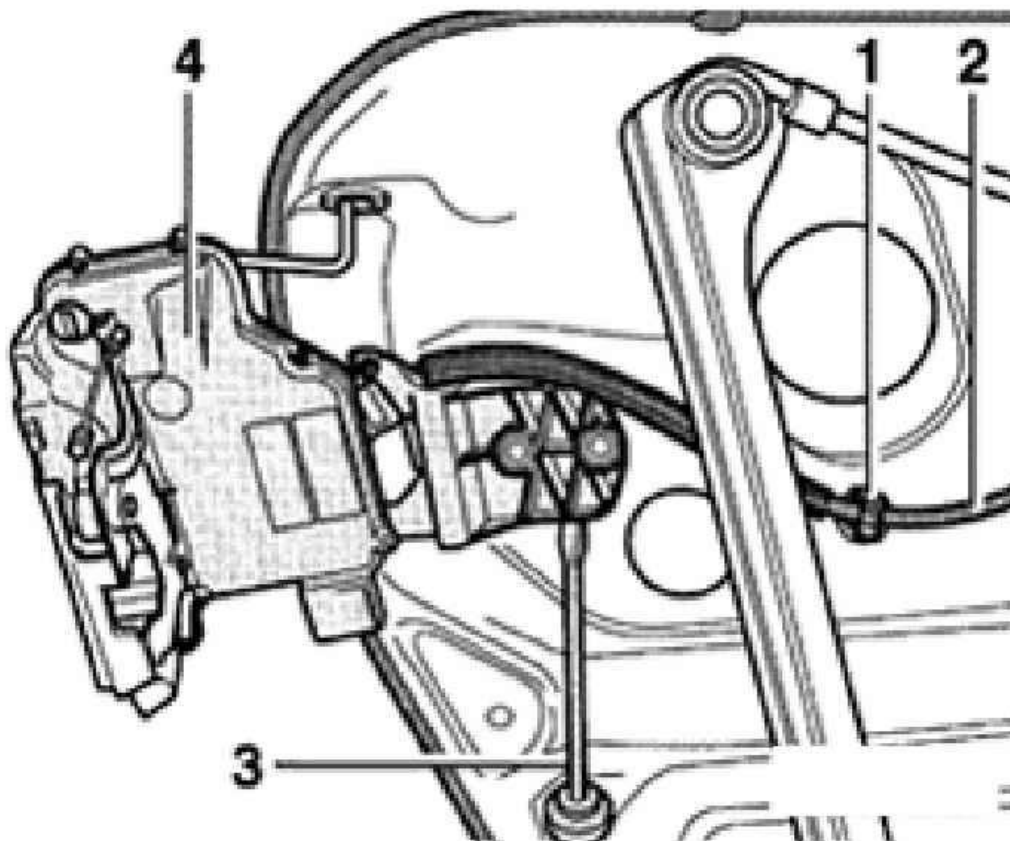


G03259158

Fig. 150: Scan Tool Display - Activating & Deactivating Cruise Control System (1 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -1- and -1- to select "Login procedure" function 11.
- Press -Q- button to confirm input

Indicated on display:



G03259159

Fig. 151: Scan Tool Display - Activating & Deactivating Cruise Control System (2 Of 3)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

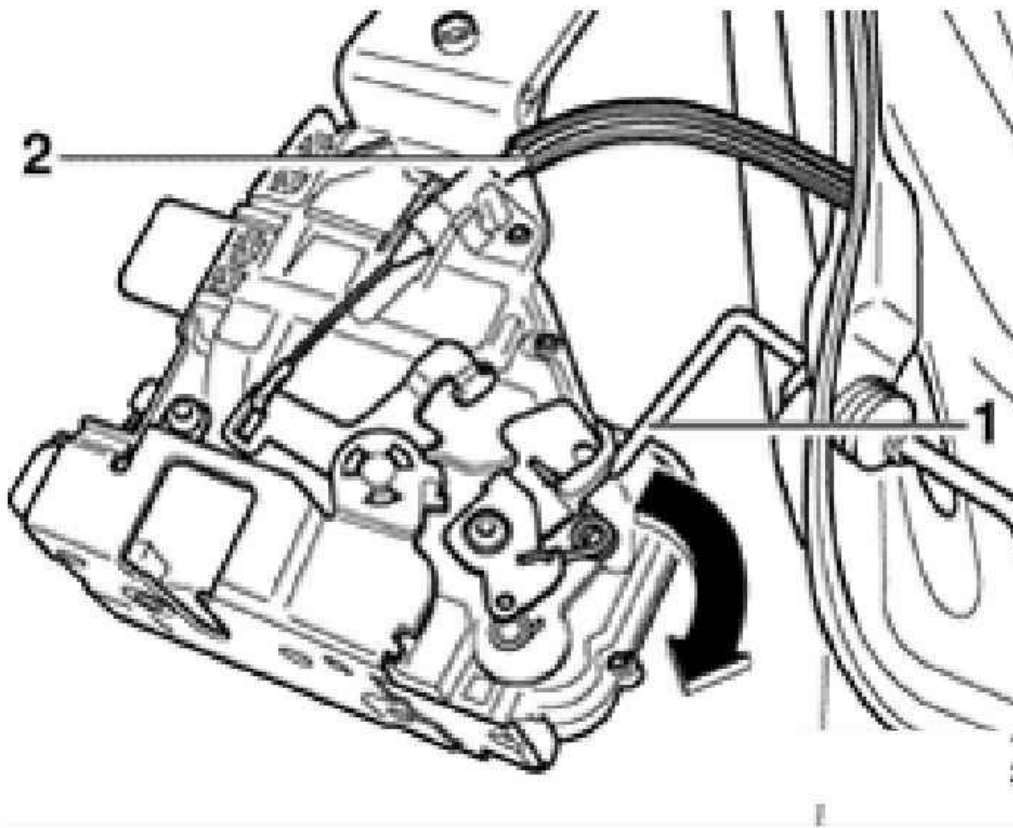
- Enter relevant code number:

Cruise Control Code Chart

Code	
11463	activate cruise control system
16167	deactivate cruise control system

- Press -Q- button to confirm input

Indicated on display:



G03259160

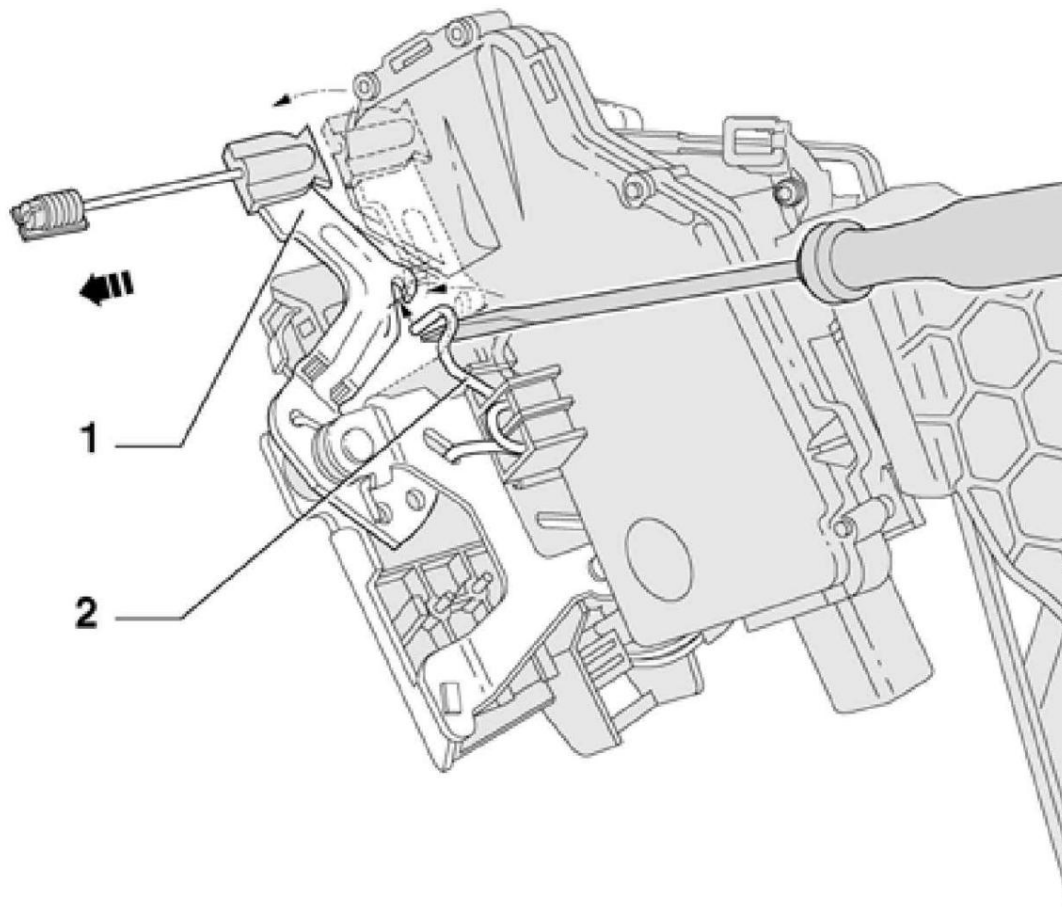
Fig. 152: Scan Tool Display - Activating & Deactivating Cruise Control System (3 Of 3)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0- and -6- buttons to select "End output" function 06
- Press -Q- button to confirm input
- Switch ignition off and then on again.
- Switch ignition off.

Checking CCS activation/deactivation

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING .**
- Press buttons -0- and -1- to insert "Engine electronics" address word 01.

Indicated on display:

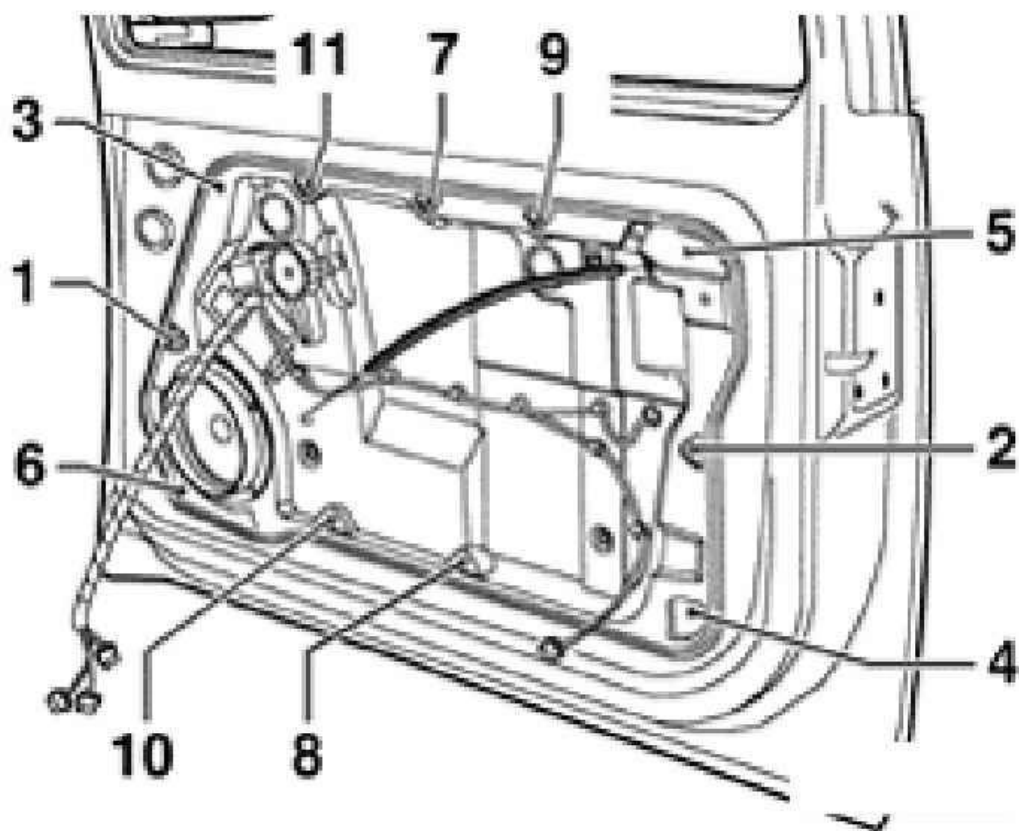


G03259161

Fig. 153: Scan Tool Display - Checking CCS Activation/Deactivation (1 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0- and -8- to select Function 08 "Read measuring value block" function 08.
- Press -Q- button to confirm input

Indicated on display:



G03259162

Fig. 154: Scan Tool Display - Checking CCS Activation/Deactivation (2 Of 3)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

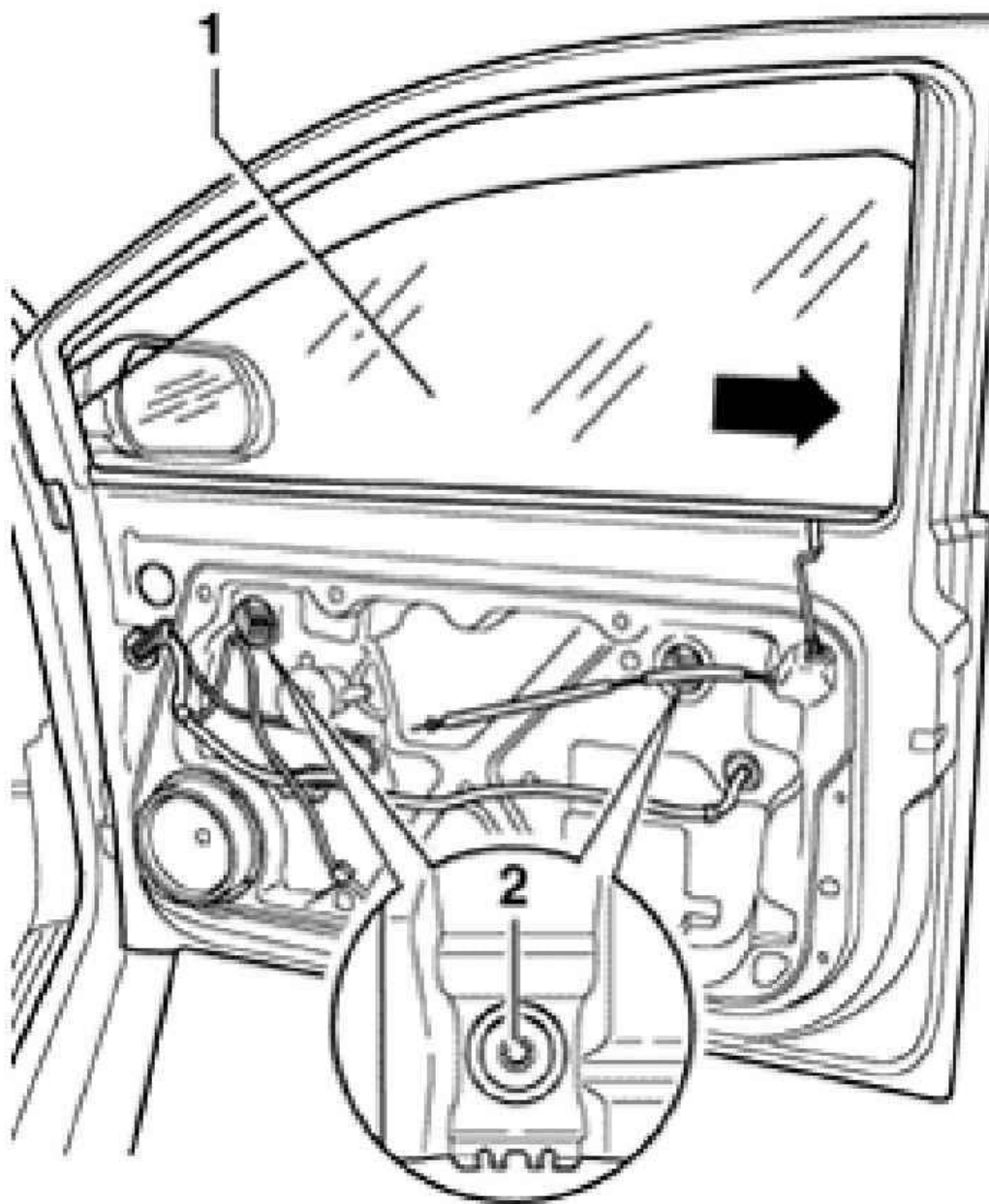
- Press buttons -0-, -0- and -6- to input display group number 006 and press -Q- button to confirm input.
- Check the specified value in display field 2:

Cruise Control Code Chart - Display Field 4

Value	Display field 4
0 or 1	cruise control system activated
255	cruise control system deactivated

- Press --> button

Indicated on display:



G03259163

Fig. 155: Scan Tool Display - Checking CCS Activation/Deactivation (3 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0- and -6- buttons to select "End output" function 06

- Press -Q- button to confirm input
- Switch ignition off.

ADDITIONAL SIGNALS, CHECKING

Vehicle Speed signal, checking

The speed signal is required for A/C compressor cut-off when accelerating, for the Cruise Control System and to improve driveability smoothness (jolt damping).

Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- VW 1594 Adapter kit
- VAG1527B Voltage tester
- Wiring diagram

Checking requirements

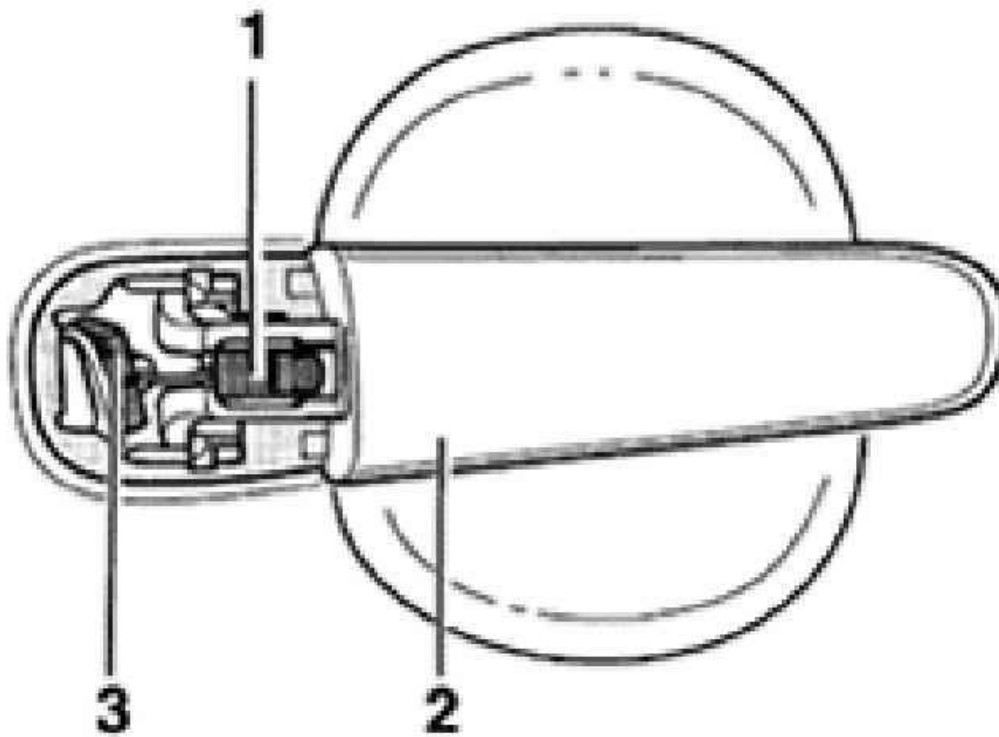
- Speedometer function and speedometer display OK.

WARNING: Secure Scan Tool to rear seat and operate from this position using a second technician.

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):

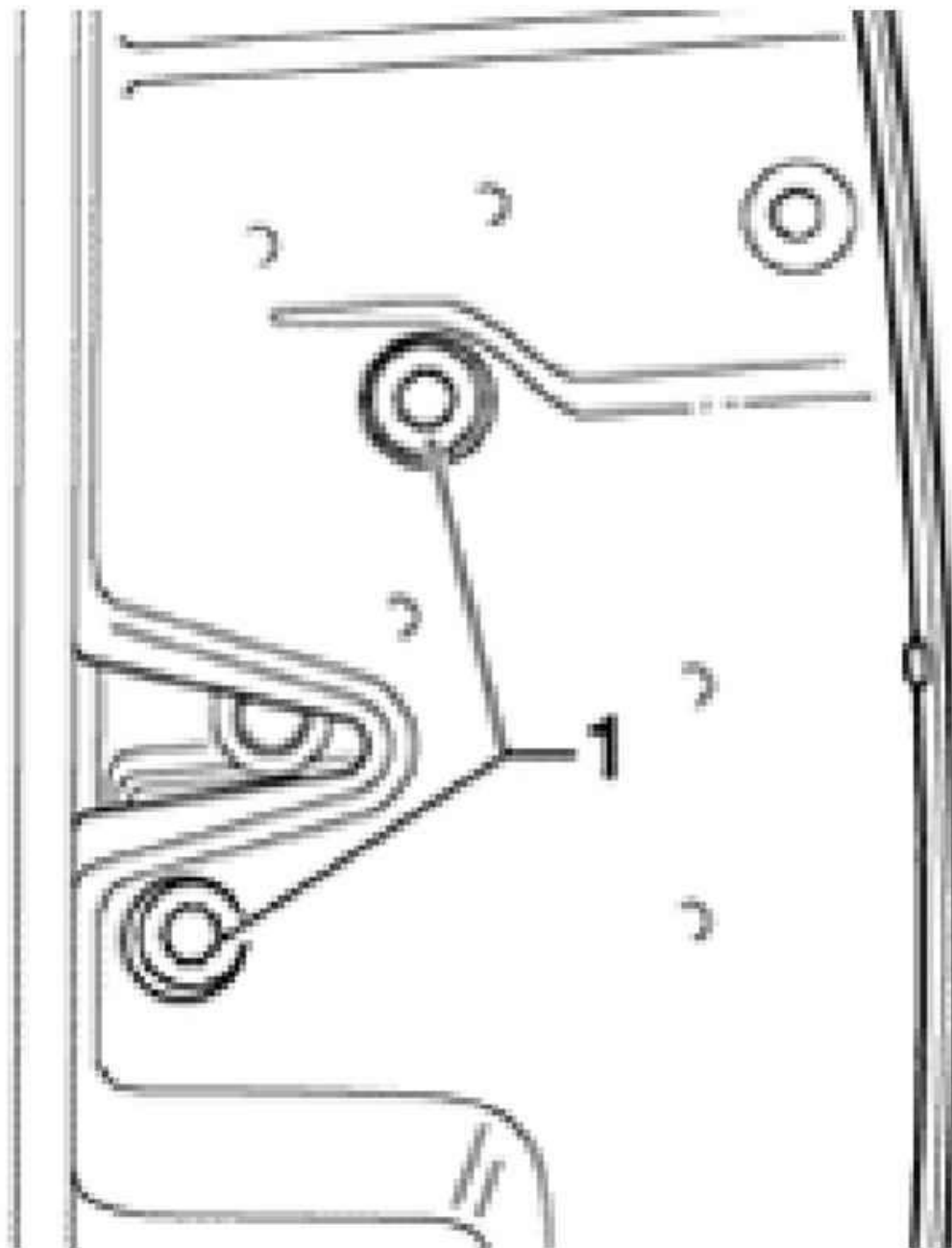


G03259164

Fig. 156: Scan Tool Display - Vehicle Speed Signal (1 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

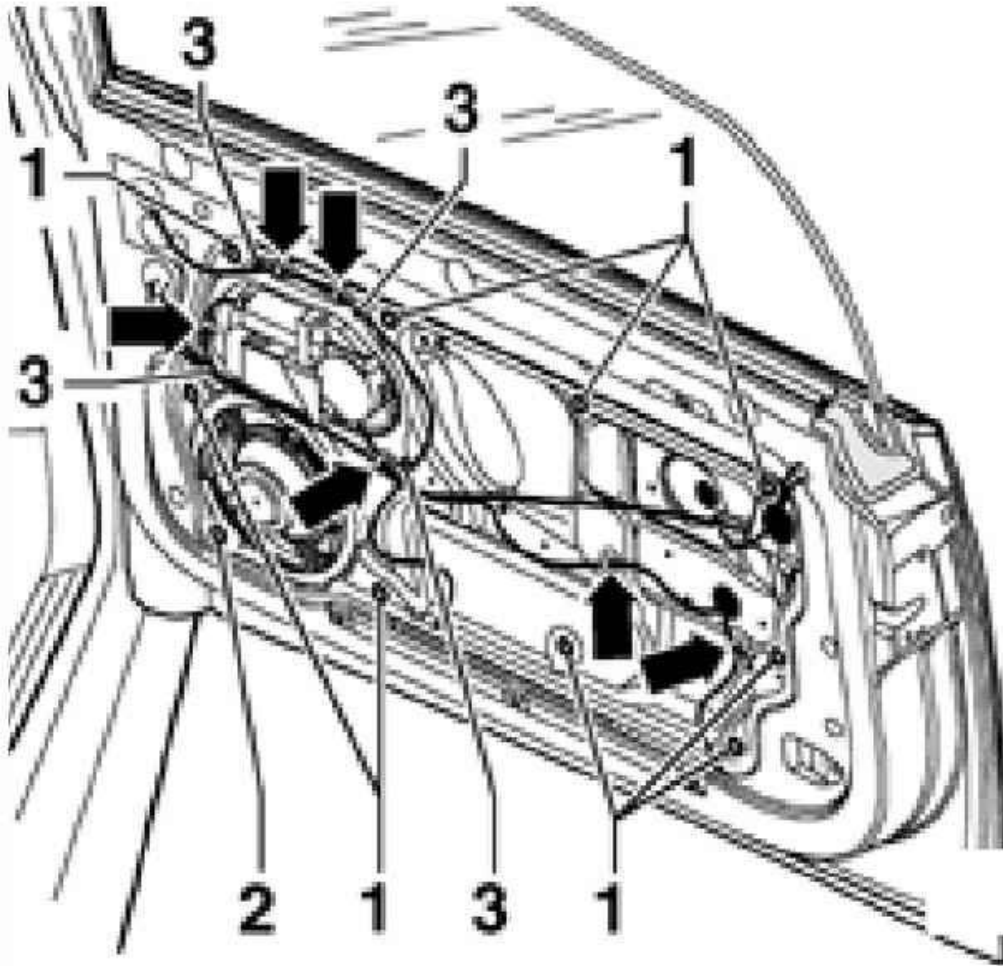


G03259165

Fig. 157: Scan Tool Display - Vehicle Speed Signal (2 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

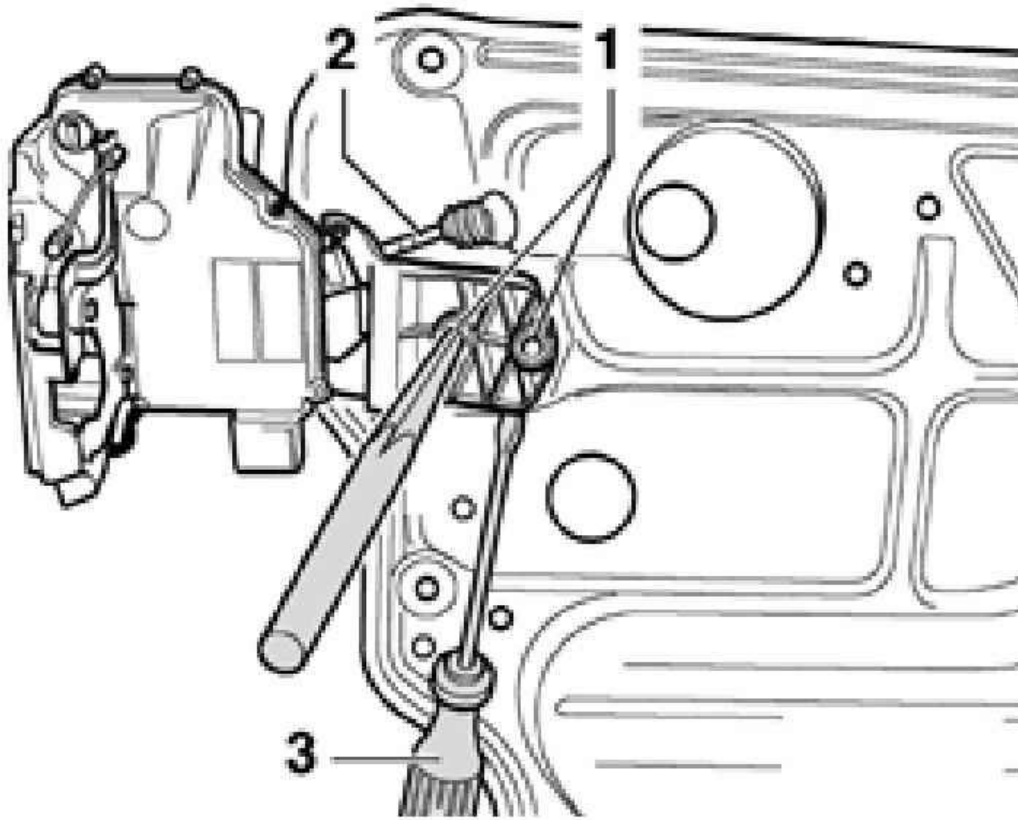


G03259166

Fig. 158: Scan Tool Display - Vehicle Speed Signal (3 Of 4)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0-, -0- and -6- buttons to select "Display group 6".
- Press -Q- button to enter input.

Display will appear as shown (1 to 4 = Display zones):



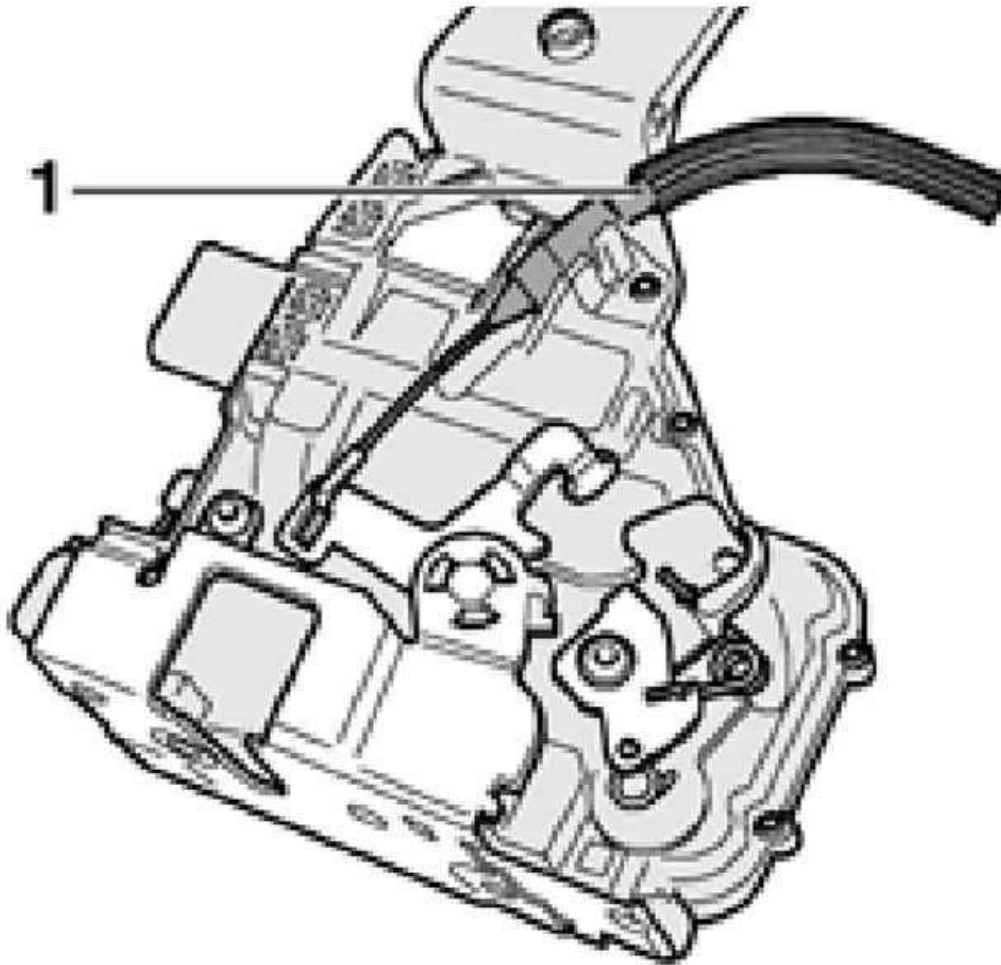
G03259167

Fig. 159: Scan Tool Display - Vehicle Speed Signal (4 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Take a test drive using a 2nd technician to observe display.
- Observe value in Display zone 1
- Specification: approx. speedometer display

If no speed indicated:

- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03259168

Fig. 160: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect LED test light between sockets:

Up to MY 1999

- 1 (Ground) and 51 (road speed signal).

From MY 2000

- 4 (Ground) and 20 (road speed signal).
- Switch ON ignition and turn front left wheel by hand.
- Voltage tester LED must blink (approx. four times per wheel rotation)

NOTE: **If necessary, hold the front right wheel to prevent it from turning.**

If LED does not blink:

- Check wiring for open/short circuit between following ECM harness connector terminal and instrument cluster using Electrical Wiring Diagram.

See appropriate System Wiring Diagram article.

Up to MY 1999

Terminal 51

From MY 2000

Terminal 20

- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Throttle Position (TP) sensor -G79-, checking up to MY 99

Throttle Position (TP) sensor -G79- is located on accelerator pedal and communicates physical pedal position to Diesel Direct Fuel Injection (DFI) Engine Control Module (ECM).

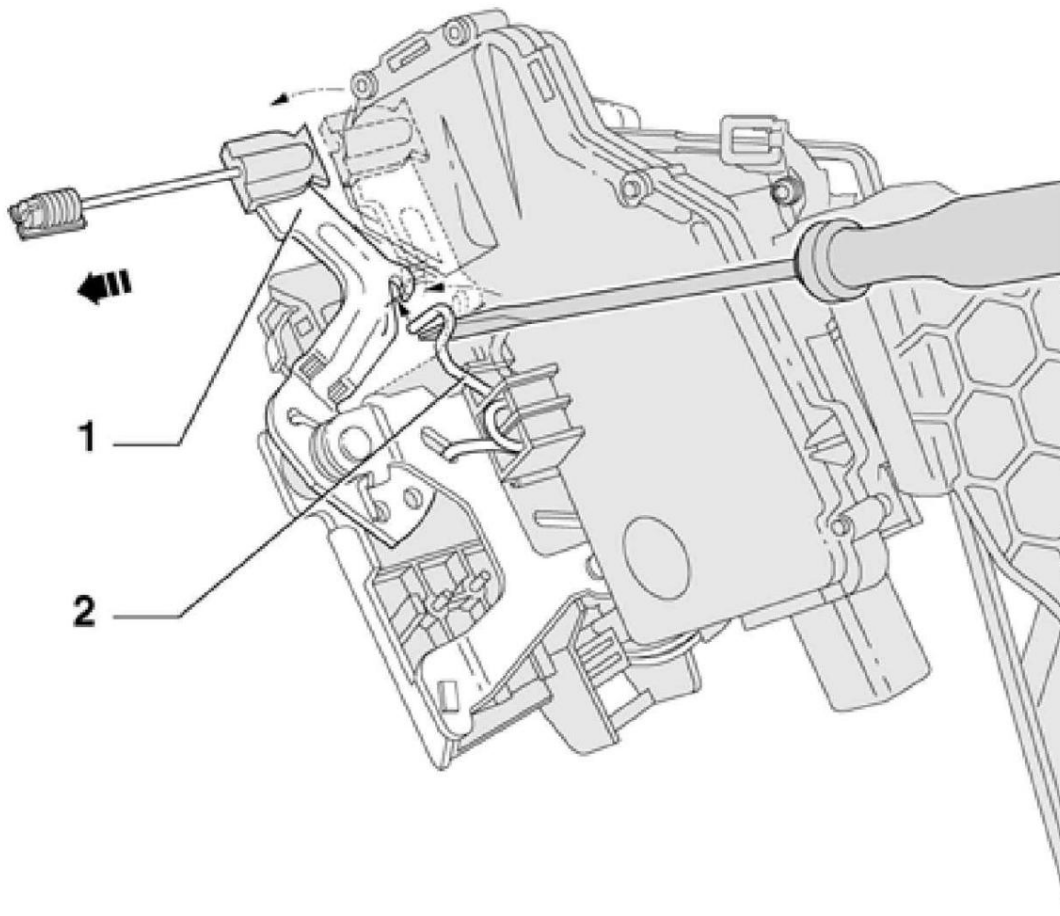
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter, or equivalent
- VW 1594 Adapter kit
- Electrical Wiring Diagrams, Troubleshooting & Component Locations

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** and switch ON ignition but do not start engine.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):

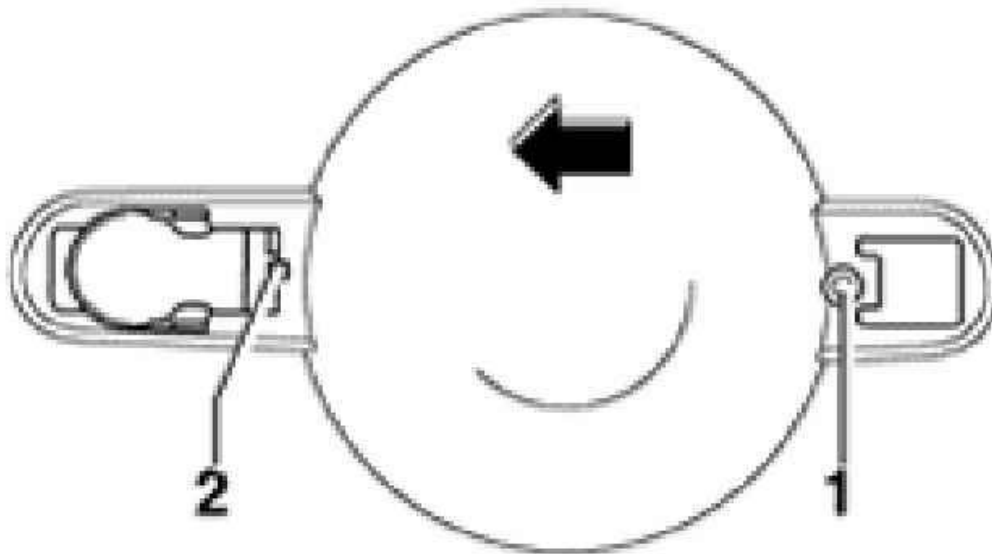


G03259169

Fig. 161: Scan Tool Display - Throttle Position Sensor, Up To MY 99 (1 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

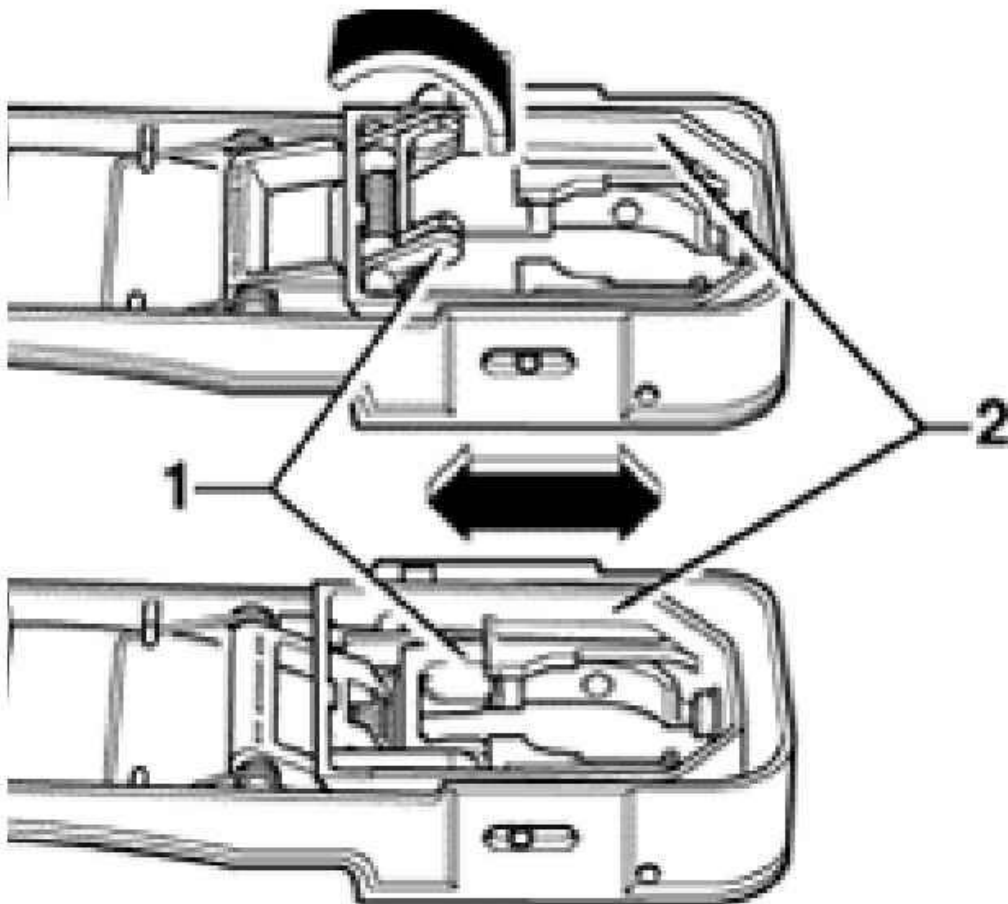


G03259170

Fig. 162: Scan Tool Display - Throttle Position Sensor, Up To MY 99 (2 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

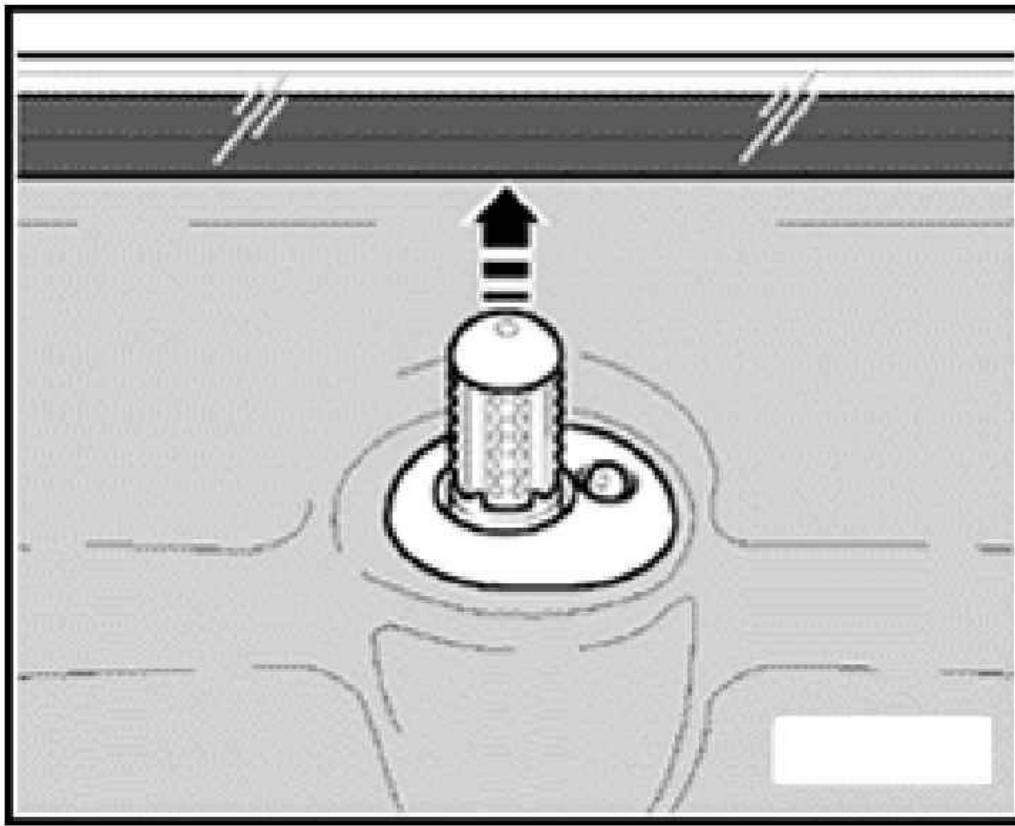
Display will appear as shown:



G03259171

Fig. 163: Scan Tool Display - Throttle Position Sensor, Up To MY 99 (3 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

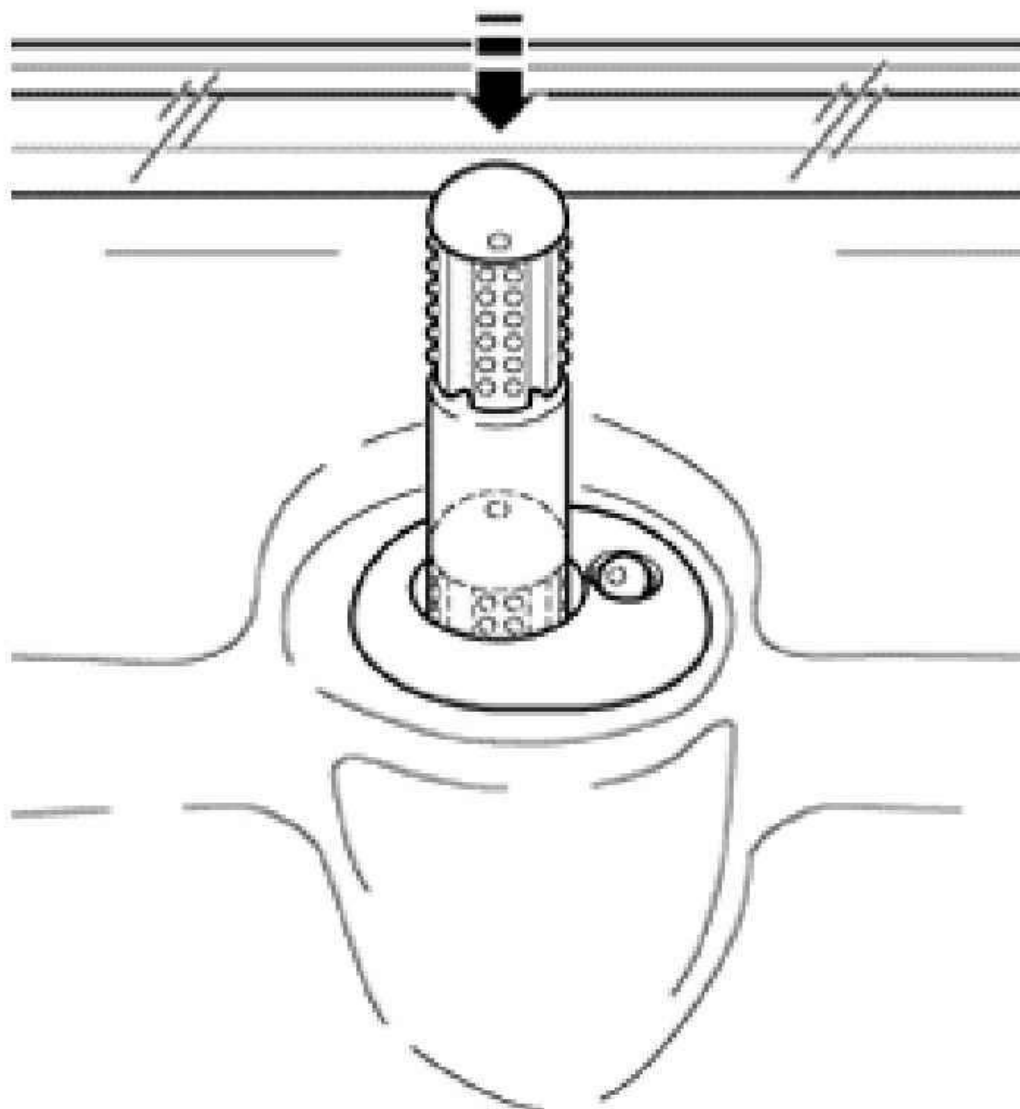
- Press 0, 0 and 2 buttons to select "Display group 2".
- Press -Q- button to enter input.
- Observe value in Display zone 2 (Throttle Position).
- Specification: 0.0% (pedal not operated)



G03259172

Fig. 164: Scan Tool Display - Throttle Position Sensor, Up To MY 99 (4 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Observe value in Display zone 3.
- Specification:



G03259173

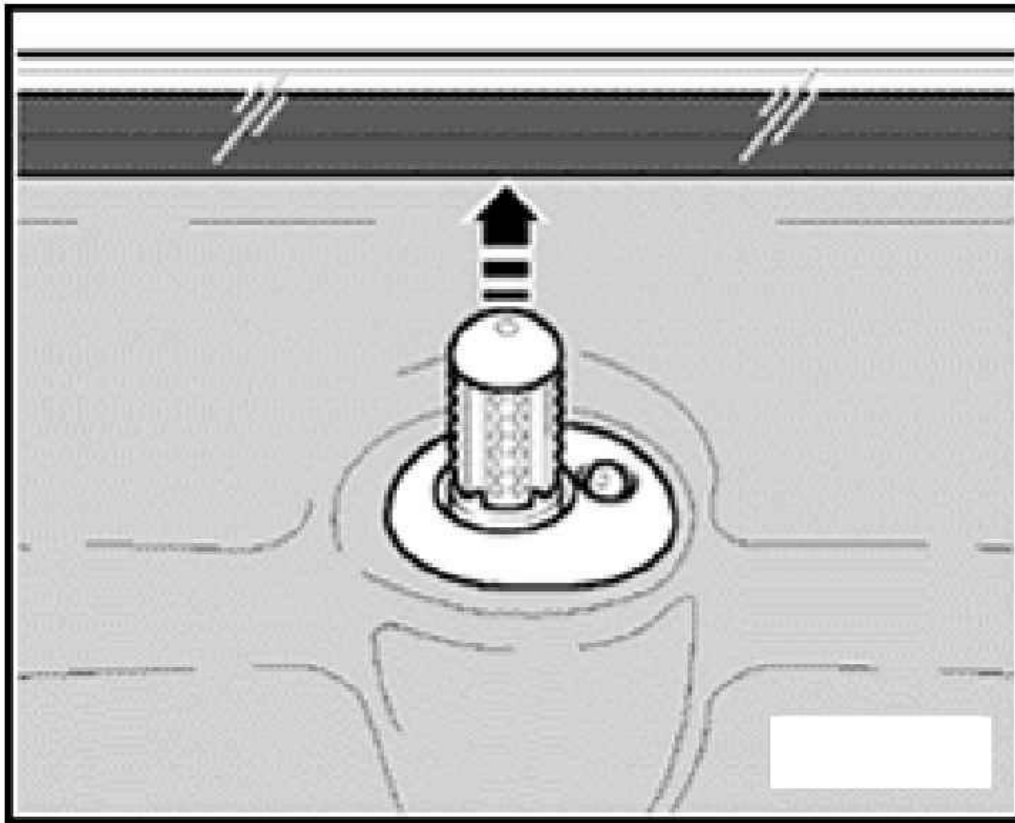
Fig. 165: Scan Tool Display - Throttle Position Sensor, Up To MY 99 (5 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

0 1 0 (pedal not operated)

0 0 0 (pedal operated)

- Press accelerator pedal down slowly.

- Specification: value in zone 2 must increase steadily up to 100% (pedal fully depressed).



G03259174

Fig. 166: Scan Tool Display - Throttle Position Sensor, Up To MY 99 (6 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

On vehicles with an automatic transmission, the kickdown switch pressure point must be distinctly felt before the Wide Open Throttle (WOT) stop position is reached.

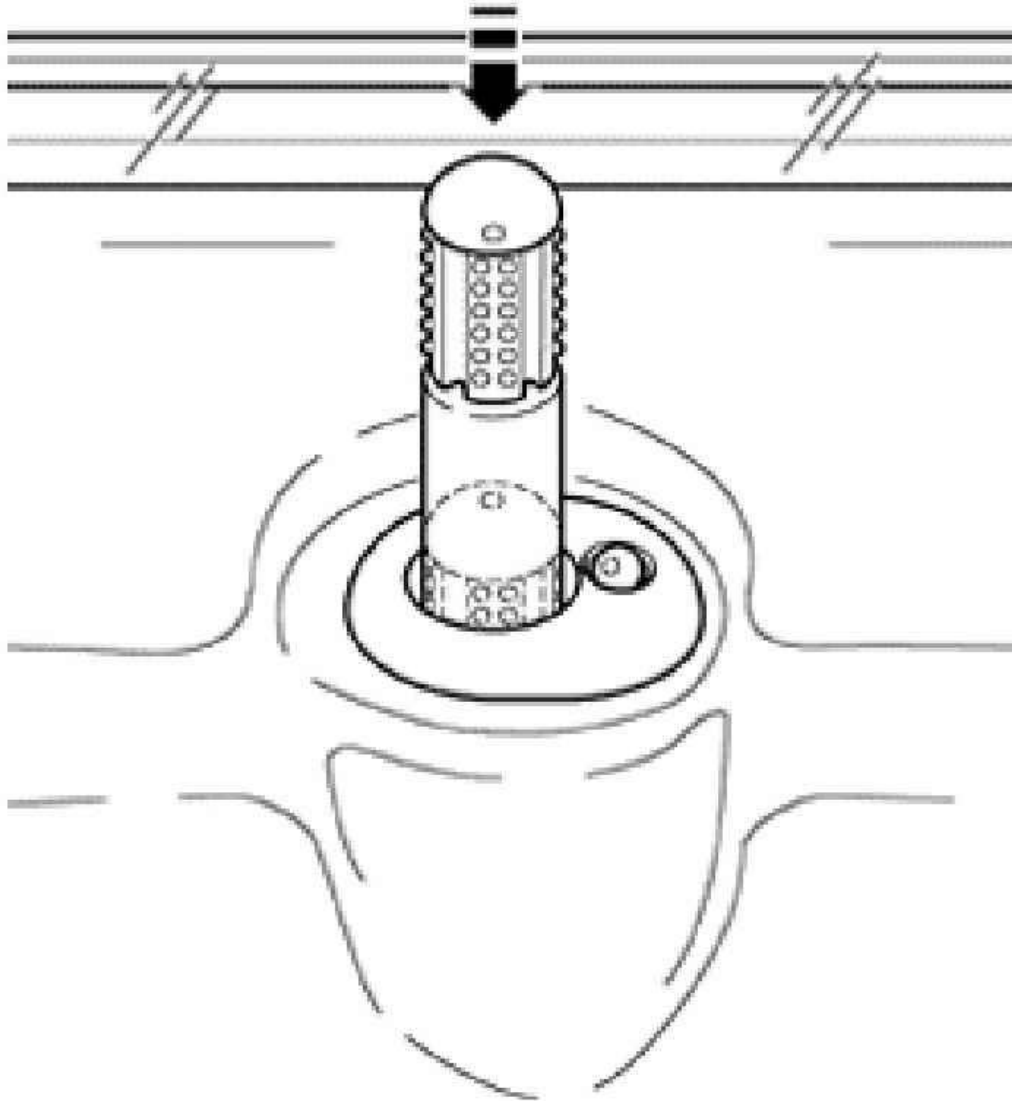
If specified end value not reached:

- Adjust Throttle Position sensor -G79-

If display does not change or is irregular:

- Check Throttle Position sensor as follows:
- Switch OFF ignition.

- Disconnect connector for sensor: Component locations overview. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .
- Carry out resistance measurement between sensor terminals 1 and 3 using Fluke 83 multimeter.



G03259175

Fig. 167: Identifying Throttle Position Sensor Terminals (Up To MY 99)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Accelerator not depressed: Idling speed

- Specification: 1.0 to 1.5 k ohm
- Accelerator depressed: wide open throttle
 - Specification: 1.5 to 2.5 k ohm

If specifications not obtained:

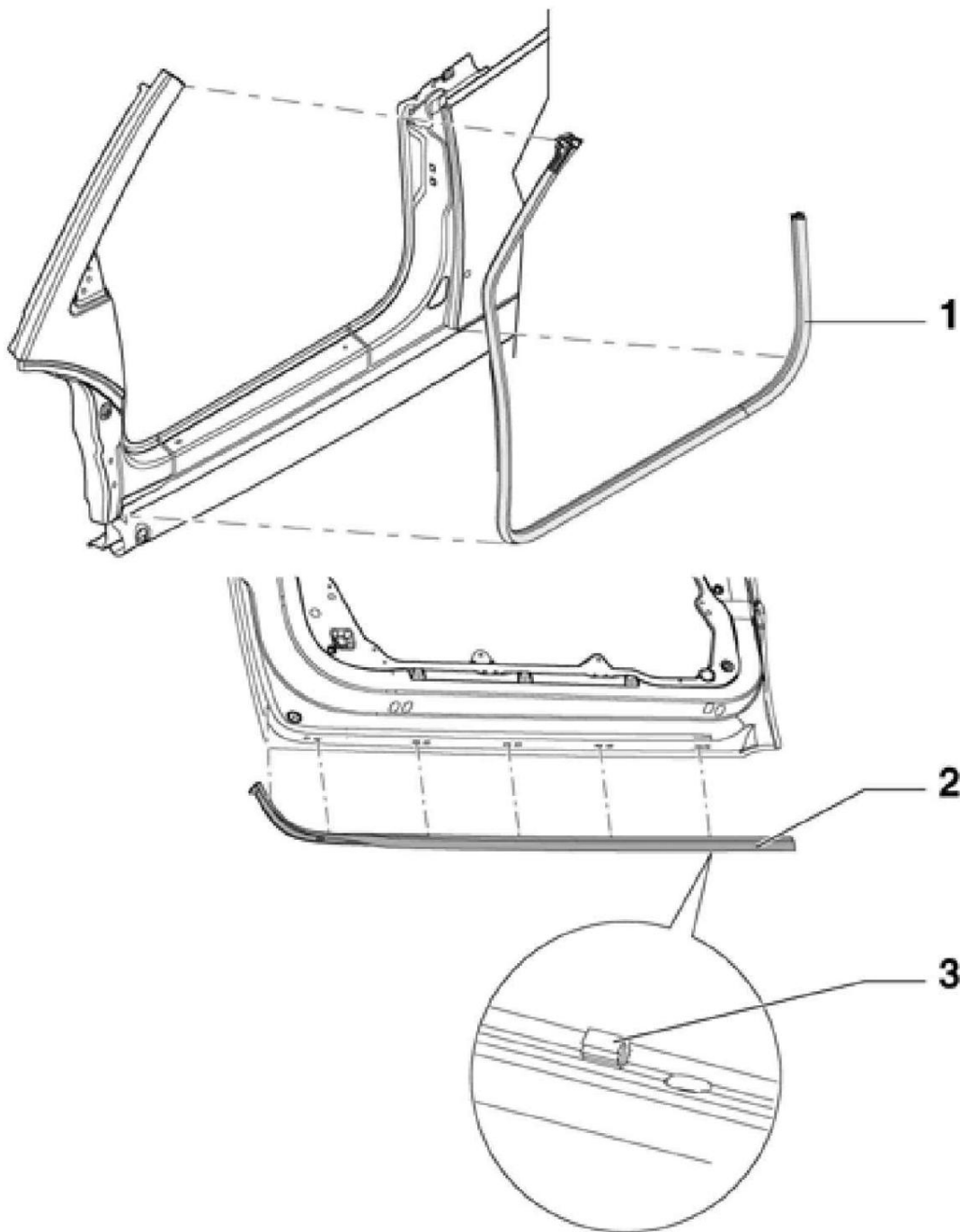
- Replace Throttle Position sensor -G79-.
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

If specifications obtained:

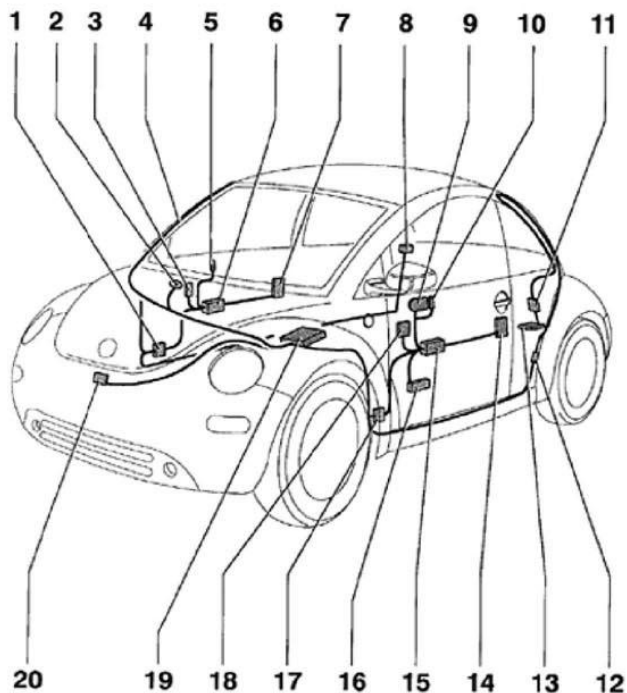
- Switch OFF ignition.
- Disconnect harness connector for sensor. See **DIESEL INJECTION SYSTEM, COMPONENT LOCATIONS OVERVIEW** .
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



- 1 - Door inner seal**
- 2 - Dust seal**
- 3 - Clip**

Fig. 168: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness (Up To MY 99)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check following combinations for open circuits and/or short to positive or negative:



- | | |
|--|--|
| 1 - Coupling station | 11 - Tailgate/trunk lid remote release motor |
| 2 - Anti-theft alarm horn | 12 - Coupling station |
| 3 - Front right power window switch | 13 - Hood lock |
| 4 - Aerial for remote control | 14 - Front left door lock |
| 5 - Interior locking switch, front passenger's side | 15 - Front left door control unit |
| 6 - Front right door control unit | 16 - Controls |
| 7 - Front right door lock | 17 - Coupling station |
| 8 - Motor for fuel tank lid unlock V155 | 18 - Power window switch |
| 9 - Exterior mirror adjustment switch and change-over switch | 19 - Central control unit |
| 10 - Interior locking switch, driver's side | 20 - Hood lock |

G03259177

Fig. 169: Identifying Throttle Position Sensor Harness Connector Terminals (Up To MY 99)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Wiring between connector terminal 1 and Test Box socket 24.
- Wiring between connector terminal 2 and Test Box socket 11.
- Wiring between connector terminal 3 and Test Box socket 23.
- Wiring between connector terminal 4 and Test Box socket 12.
- Wiring between connector terminal 5 and Test Box socket 8.
- Wiring between connector terminal 6 and Test Box socket 25.

From MY 2000

- Wiring between connector terminal 1 and Test Box socket 63.
- Wiring between connector terminal 2 and Test Box socket 12.
- Wiring between connector terminal 3 and Test Box socket 50.
- Wiring between connector terminal 4 and Test Box socket 69.
- Wiring between connector terminal 5 and Test Box socket 70.
- Wiring between connector terminal 6 and Test Box socket 51.
- Correct any open/short circuit as required.

If neither an open or short circuit exists:

- Replace Engine Control Module -J248-.
- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Throttle Position (TP) sensor -G79-, checking from MY 99

Throttle Position (TP) sensor -G79- is located on accelerator pedal and communicates physical pedal position to Diesel Direct Fuel Injection (DFI) Engine Control Module (ECM).

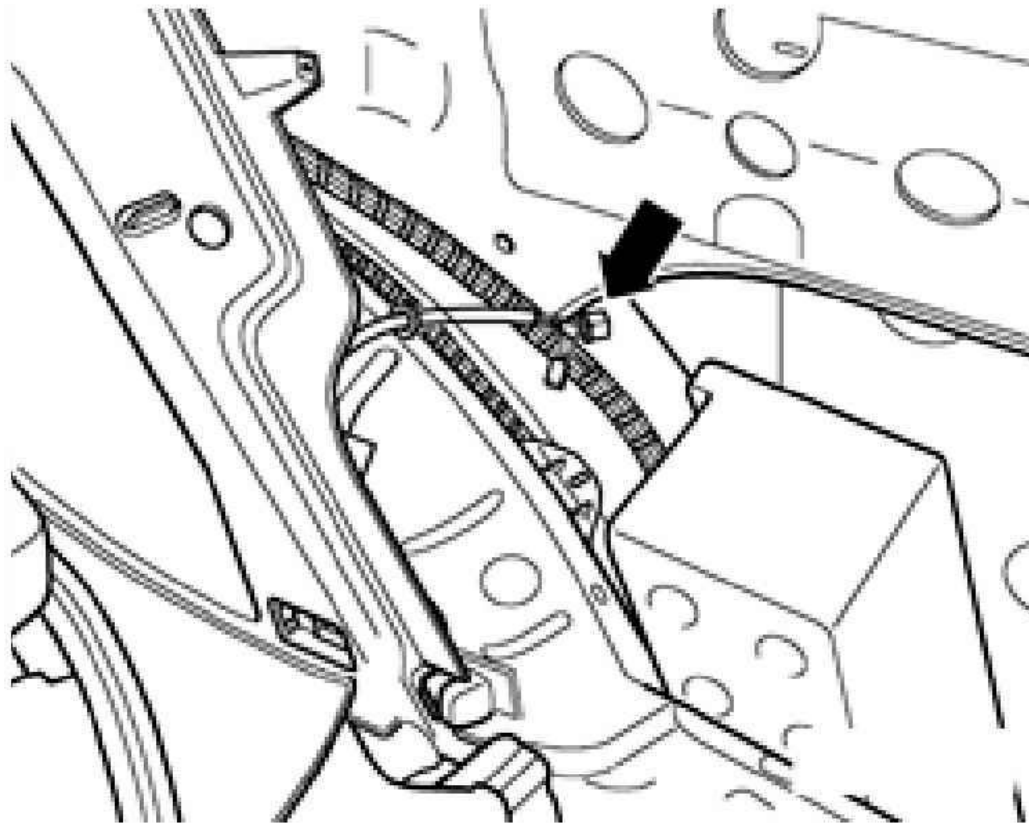
Special tools

- VAG1551/1552 Scan Tool with VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter, or equivalent
- VW 1594 Adapter kit
- Electrical Wiring Diagrams, Troubleshooting & Component Locations

Test sequence

- Switch ON ignition but do not start engine.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):

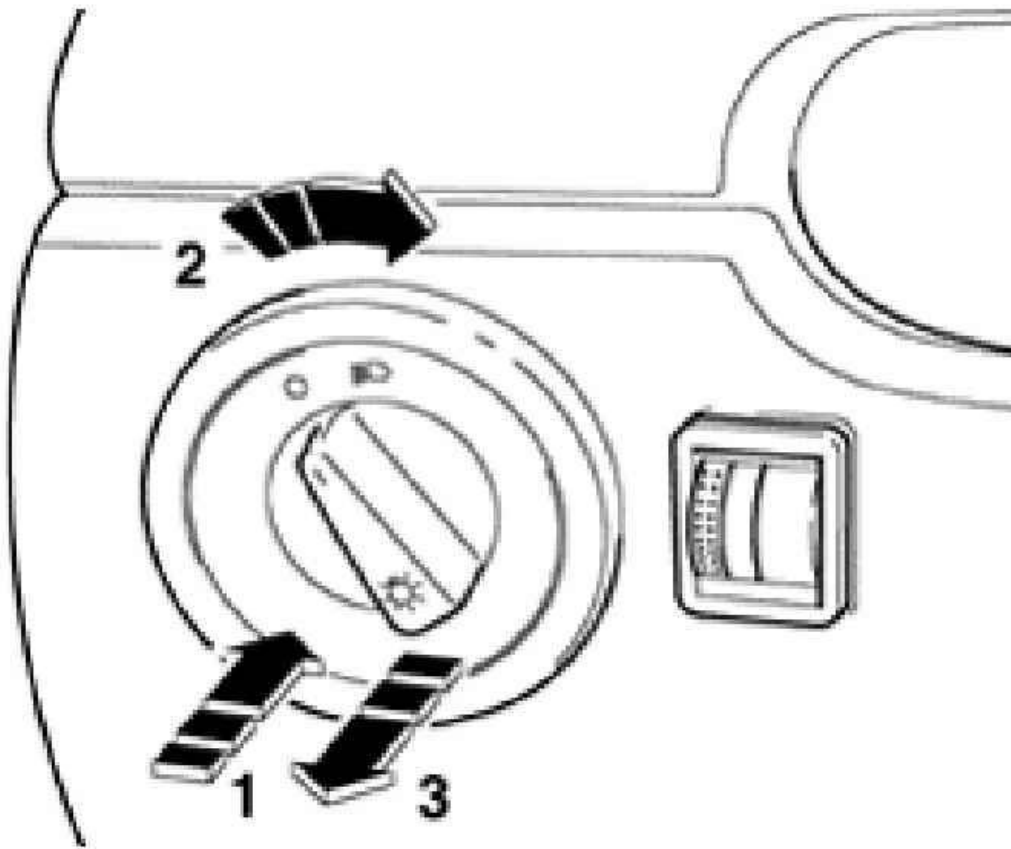


G03258743

Fig. 170: Scan Tool Display - Throttle Position Sensor, From MY 99 (1 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

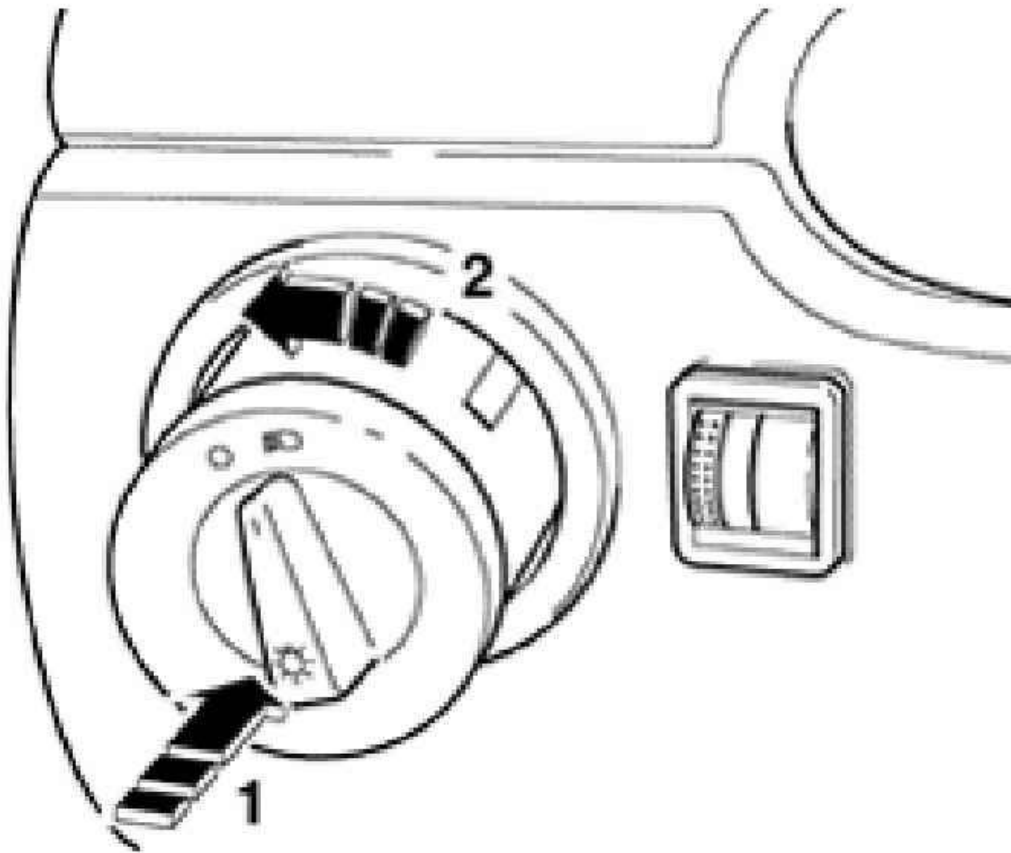


G03259887

Fig. 171: Scan Tool Display - Throttle Position Sensor, From MY 99 (2 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

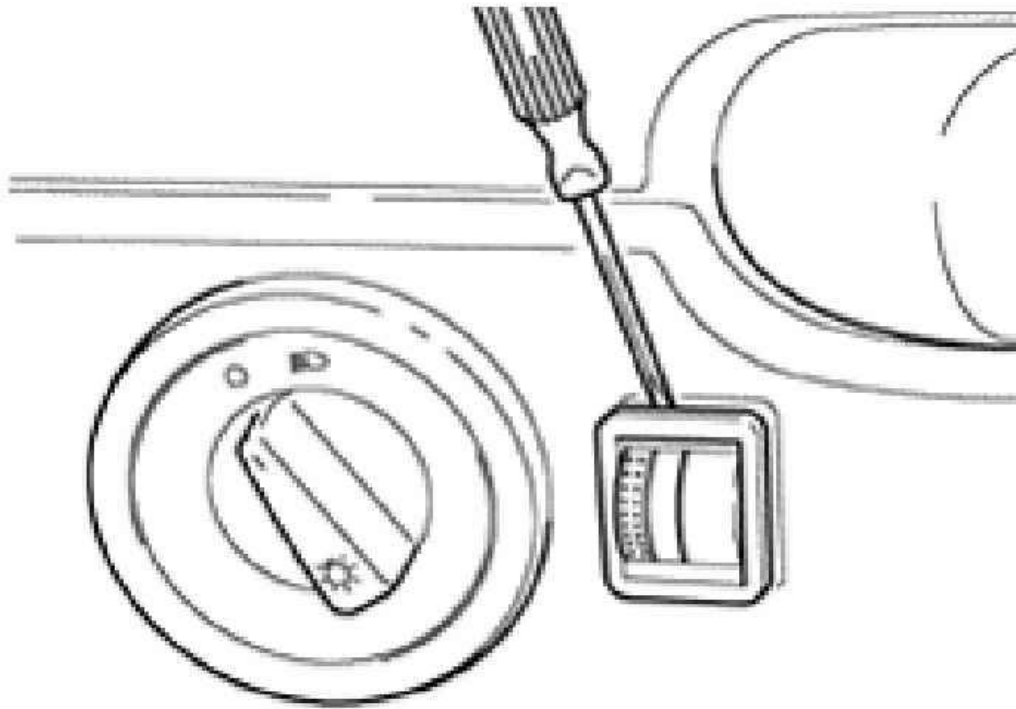
Display will appear as shown:



G03259888

Fig. 172: Scan Tool Display - Throttle Position Sensor, From MY 99 (3 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

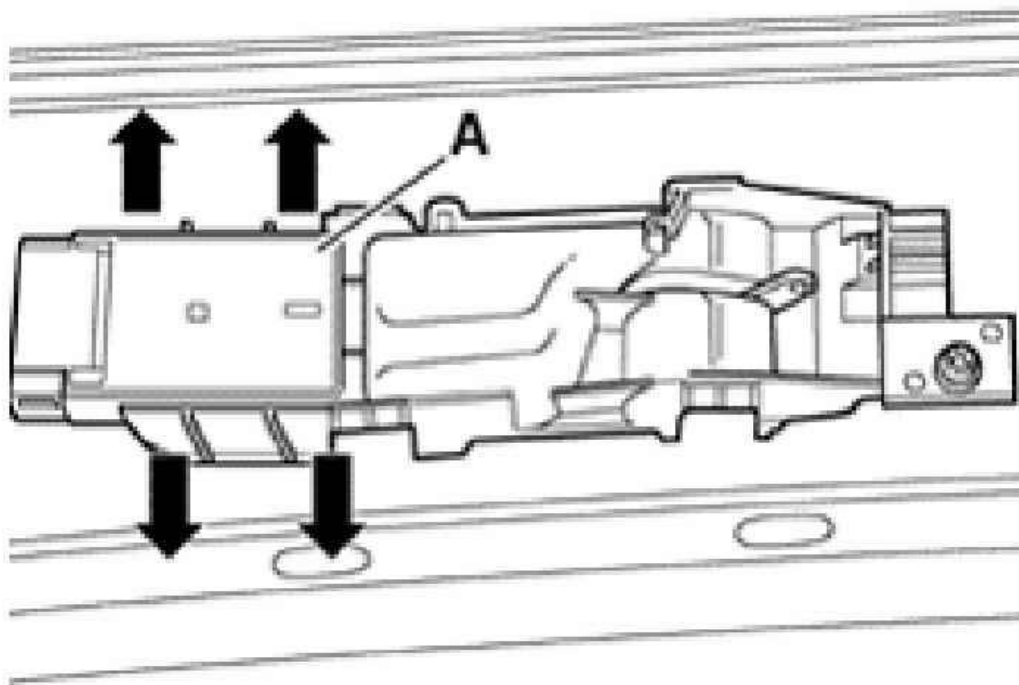
- Press 0, 0 and 2 buttons to select "Display group 2".
- Press -Q- button to enter input.
- Observe value in Display zone 2 (Throttle Position).
- Specification: 0.0% (pedal not operated)



G03259889

Fig. 173: Scan Tool Display - Throttle Position Sensor, From MY 99 (4 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Observe value in Display zone 3.
- Specification:



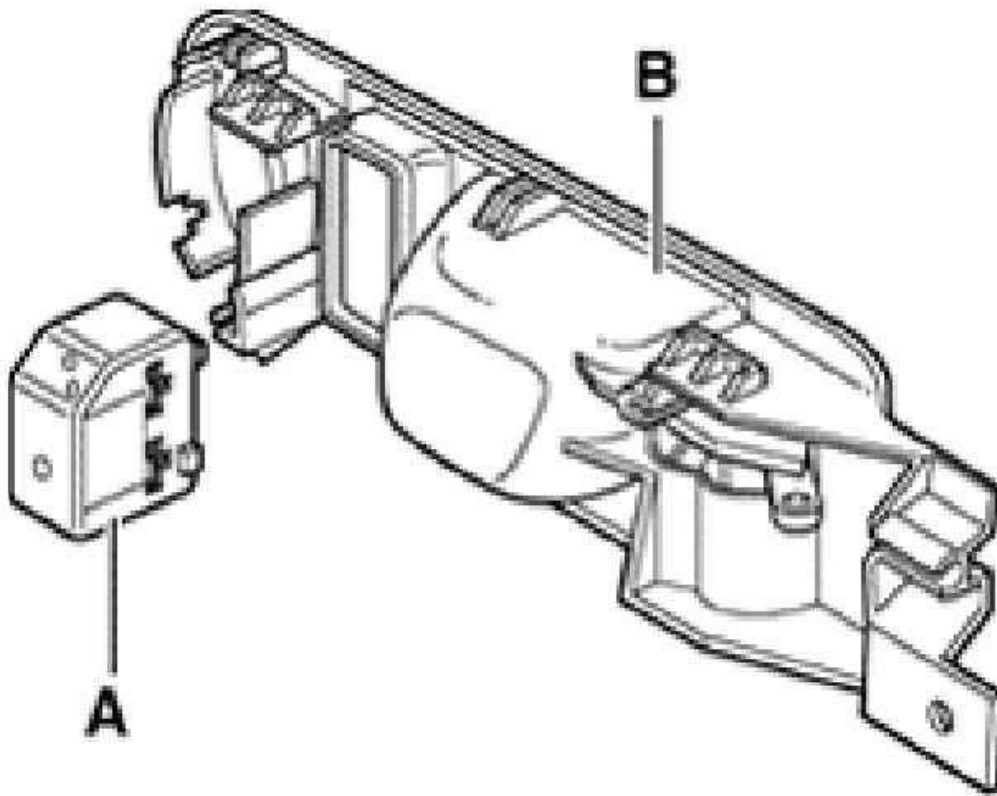
G03259890

Fig. 174: Scan Tool Display - Throttle Position Sensor, From MY 99 (5 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

0 1 0 (pedal not operated)

0 0 0 (pedal operated)

- Press accelerator pedal down slowly.
- Specification: value in zone 2 must increase steadily up to 100% (pedal fully depressed).



G03259891

Fig. 175: Scan Tool Display - Throttle Position Sensor, From MY 99 (6 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

On vehicles with an automatic transmission, the kickdown switch pressure point must be distinctly felt before the Wide Open Throttle (WOT) stop position is reached.

If specified end value not reached:

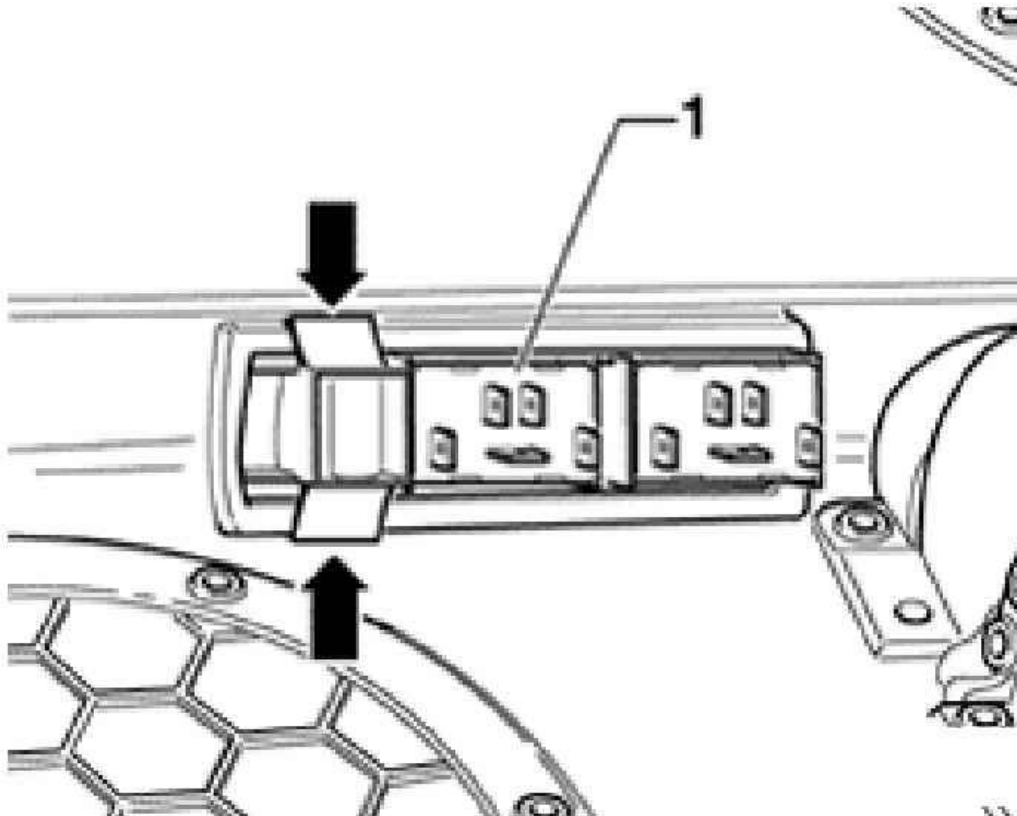
- Replace Throttle Position sensor -G79-

If display does not change or is irregular:

- Check Throttle Position sensor as follows:
- Switch OFF ignition.
- Disconnect harness connector for sensor. See **DIESEL INJECTION SYSTEM, COMPONENT**

LOCATIONS OVERVIEW .

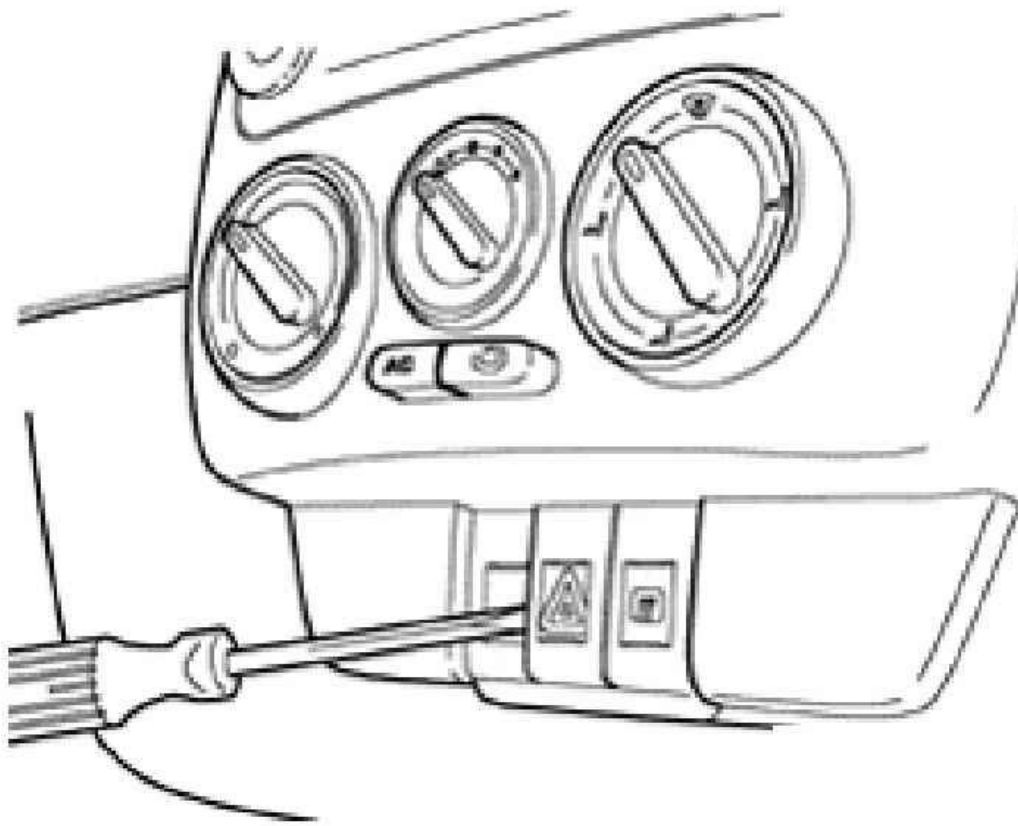
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.



G03259892

Fig. 176: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness (From MY 99)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Check following combinations for open circuits and/or short to positive or negative:



G03259893

Fig. 177: Identifying Throttle Position Sensor Harness Connector Terminals (From MY 99)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Wiring between connector terminal 1 and Test Box socket 8.
- Wiring between connector terminal 2 and Test Box socket 11.
- Wiring between connector terminal 3 and Test Box socket 23.
- Wiring between connector terminal 4 and Test Box socket 24.
- Wiring between connector terminal 5 and Test Box socket 12.
- Wiring between connector terminal 6 and Test Box socket 25.
- Correct any open/short circuit as required.

If neither open nor short circuit exists:

- Replace Engine Control Module -J248-.

- Display the Readiness code. See **READINESS CODE, DISPLAYING** .

If DTC memory was erased:

- Set the readiness code. See **READINESS CODE, SETTING** .

Transmission range selector signal, checking

The Engine Control Module (ECM) receives the Transmission Range change signal from the Transmission Control Module (TCM) via the data bus. The ECM briefly reduces the injection quantity and thus reduces the torque and resulting shift jolt.

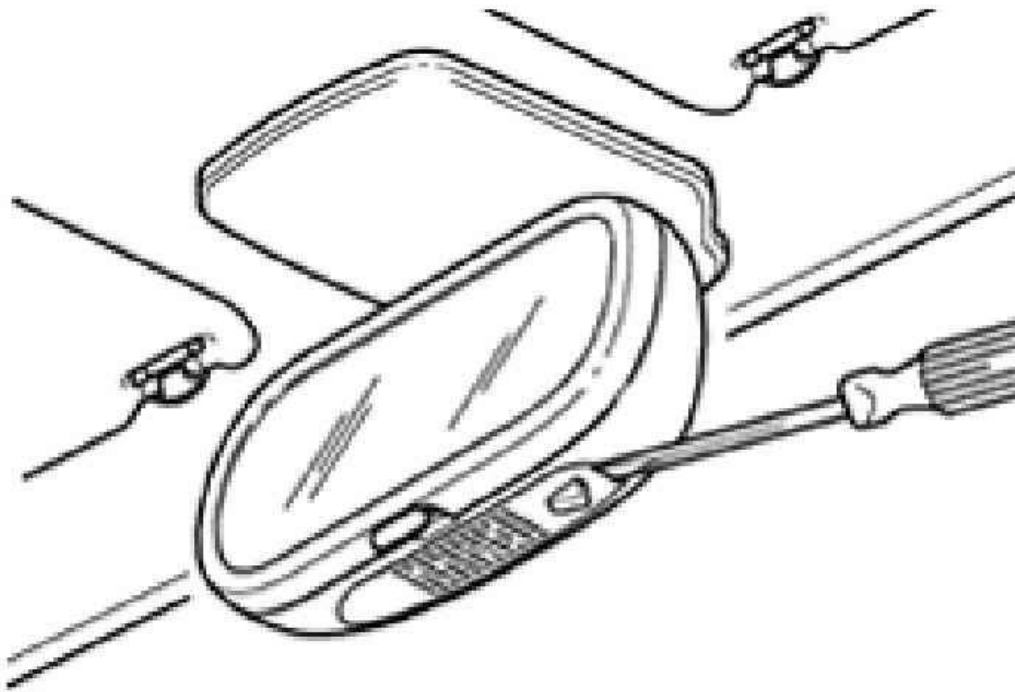
Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** and start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):

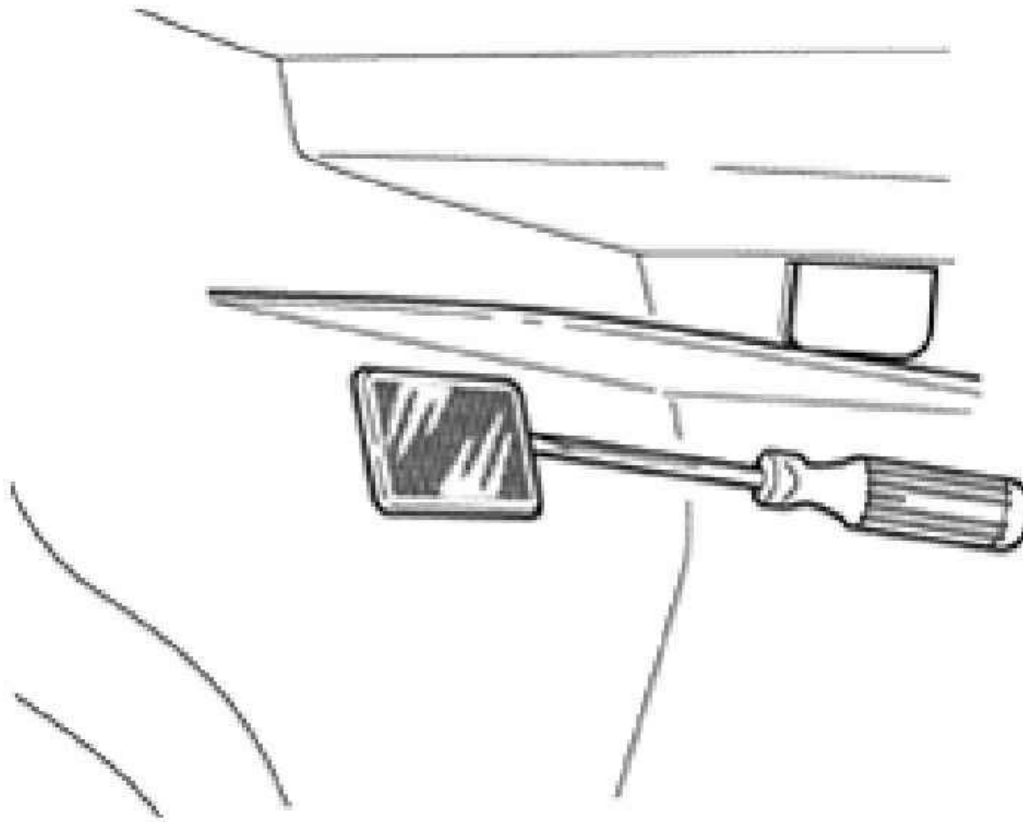


G03259894

Fig. 178: Scan Tool Display - Transmission Range Selector Signal (1 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

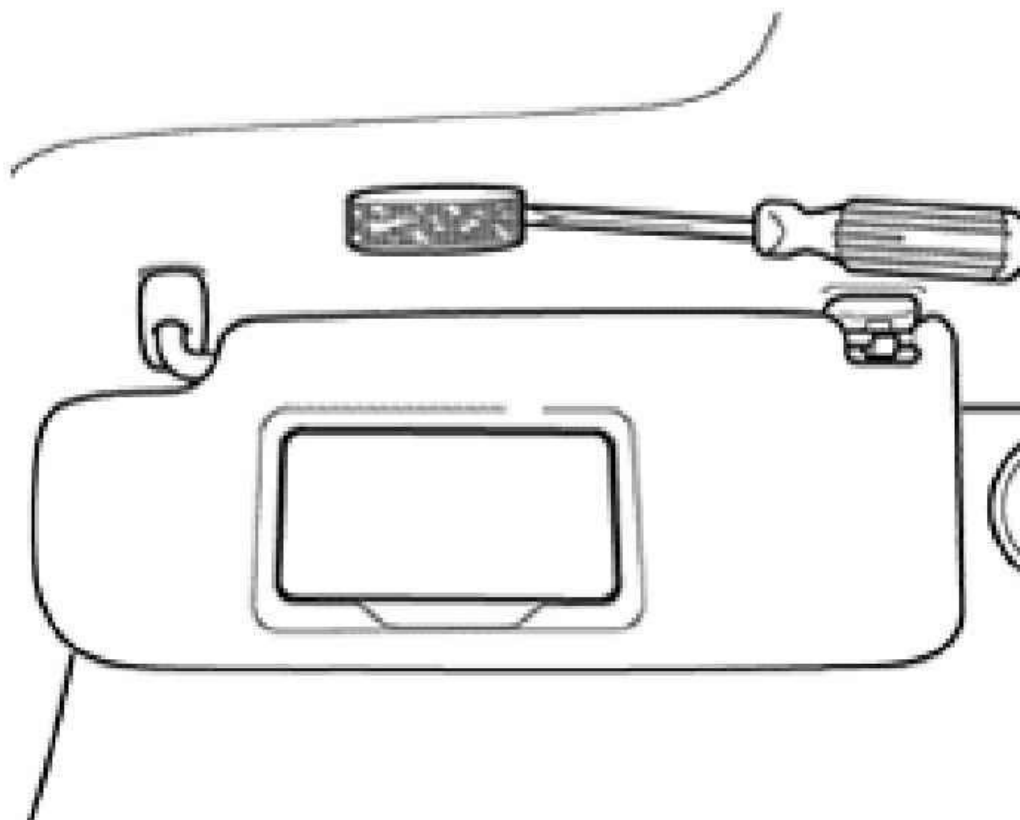


G03259895

Fig. 179: Scan Tool Display - Transmission Range Selector Signal (2 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:



G03259896

Fig. 180: Scan Tool Display - Transmission Range Selector Signal (3 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0-, -0- and -9- buttons to select "Display group 9".
- Press -Q- button to enter input.

WARNING: Secure Scan Tool to rear seat and operate from this position using a second technician.

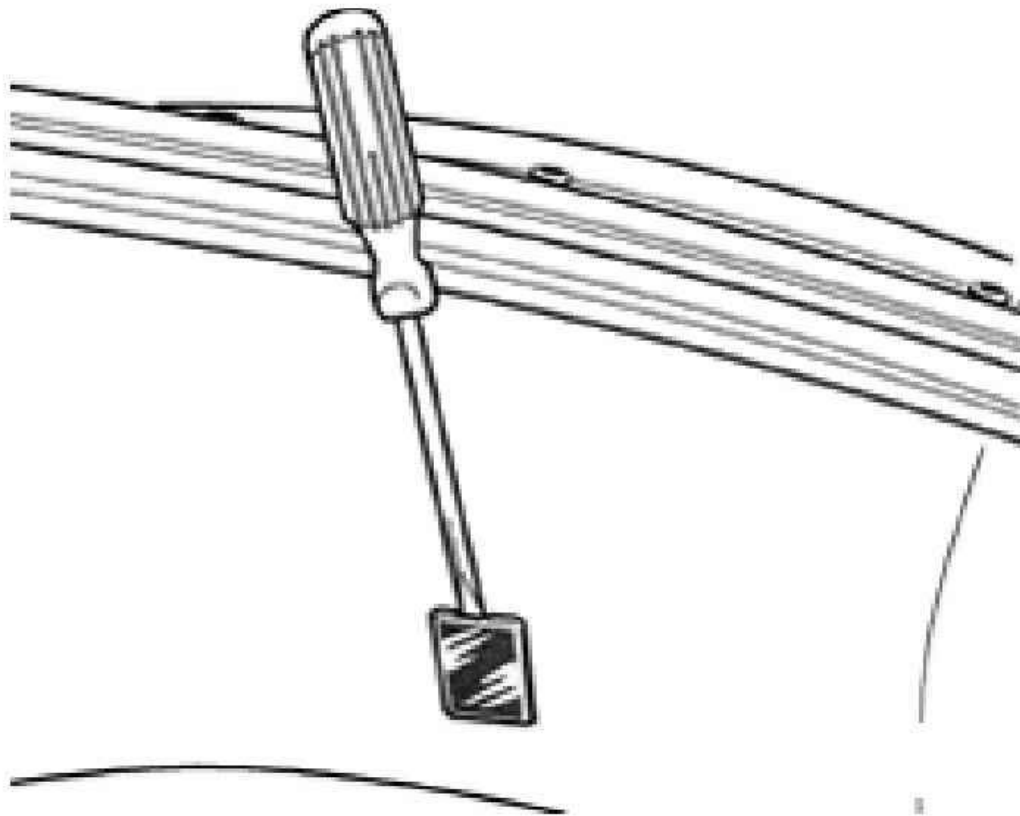
- Take a test drive and observe display using 2nd technician.
- Observe value in Display zone 3 when changing 2nd gear
- Specification: momentarily less than 51 mg/h

NOTE: Data transfer is slow, making it possible for delayed displays.

If specification not obtained:

- Press -> button.

Display will appear as shown:



G03259897

Fig. 181: Scan Tool Display - Transmission Range Selector Signal (4 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -6- buttons to select Function 06: "End output".
- Press -Q- button to enter input.
- Switch OFF ignition.
- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.

VAS 5051



G03259898

Fig. 182: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring between ECM and TCM for open / short circuits.

See appropriate System Wiring Diagram article.

A/C system signals, checking

Special tools

- VAG1551/1552 Scan Tool using VAG1551/3 Adapter cable
- VAG1598/22 Test Box (MY 1999)
- VAG1598/31 Test Box (from MY 2000)
- Fluke 83 multimeter
- VW 1594 Adapter kit
- Wiring diagram

Checking requirements

- A/C function OK
- No malfunctions stored in DTC memory. See **DTC MEMORY, CHECKING** .
- Vehicle temperature: +15 °C (59 °F) minimum
- A/C system switched ON

A/C compressor shut-off, checking

The A/C control head signals the Engine Control Module that the A/C compressor will be switched ON via the A/C compressor signal.

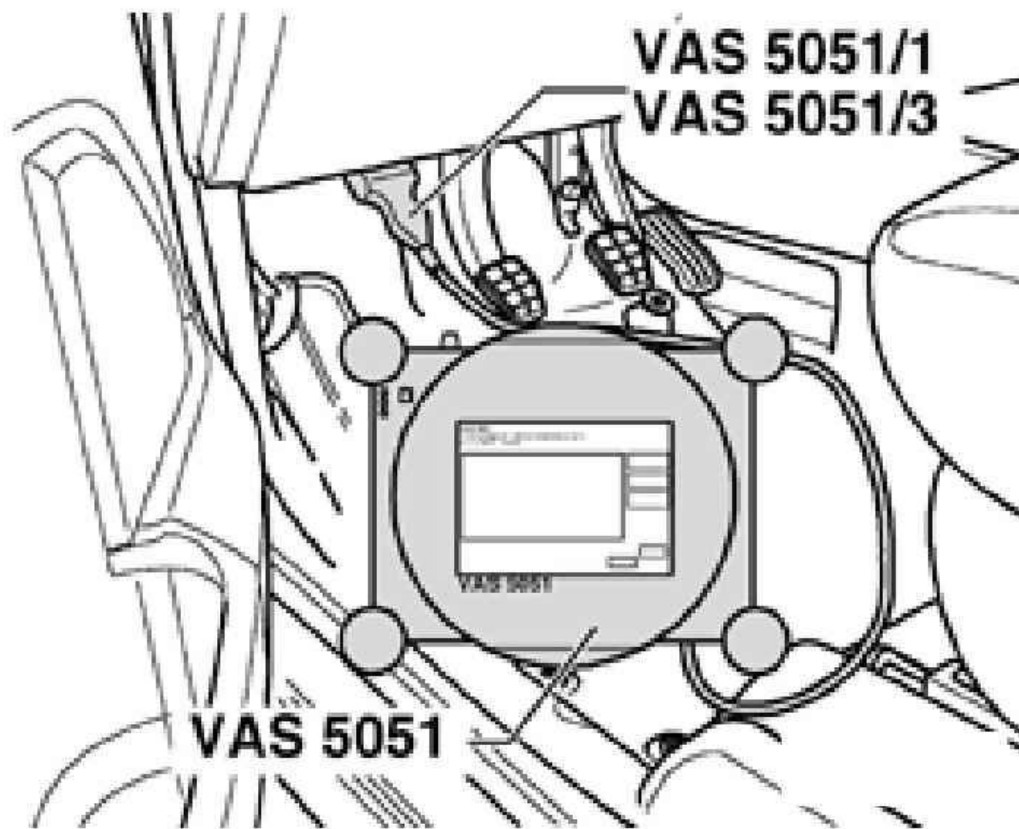
Using the same wiring, the A/C compressor is switched OFF by the ECM under the following circumstances:

- Hard acceleration from low speed
- Engine is running under an emergency program
- Engine Coolant Temperature exceeds +120 °C (248 °F)
- During every engine start for approx. 6 seconds.

Checking

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):

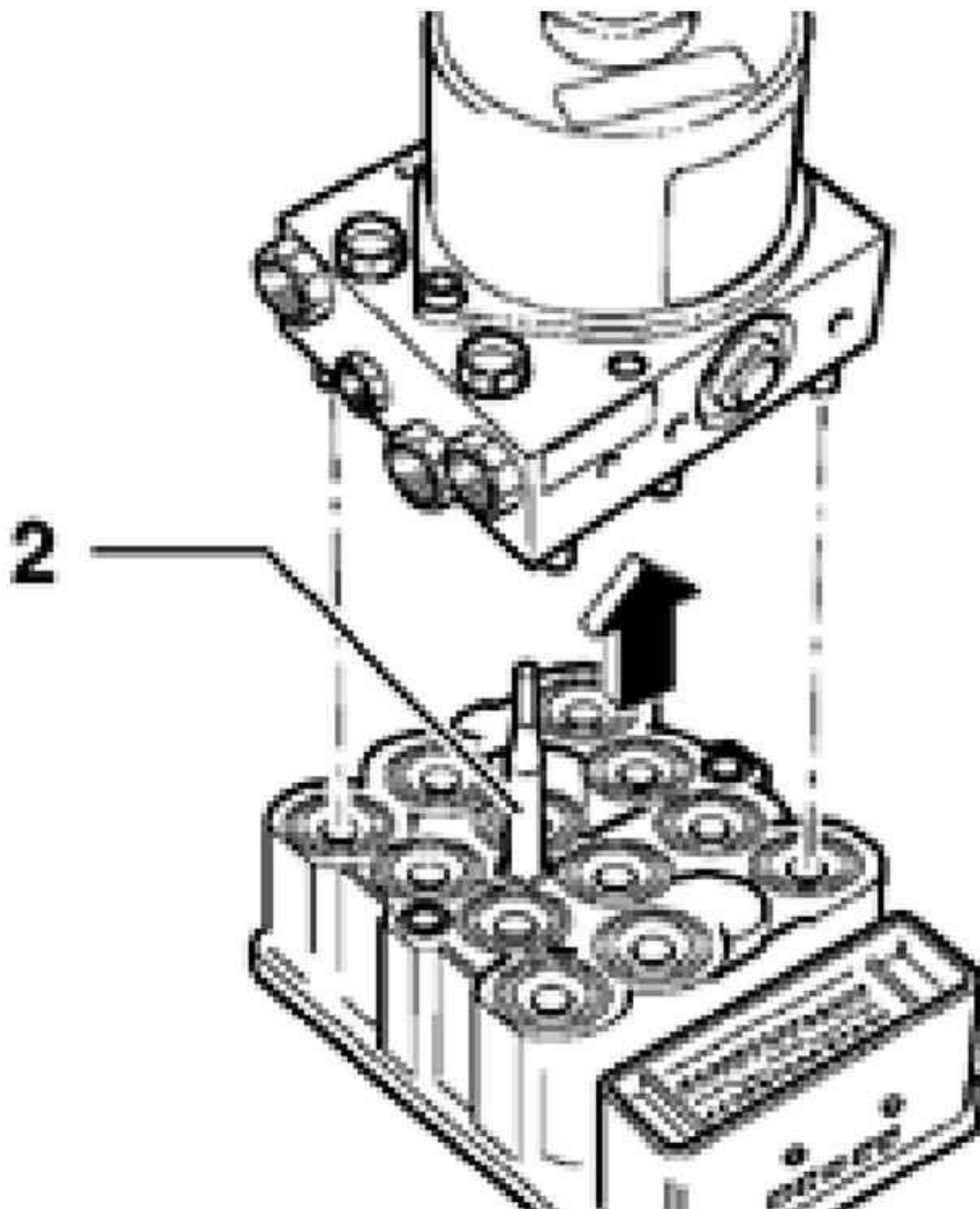


G03259899

Fig. 183: Scan Tool Display - A/C System Signals (1 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

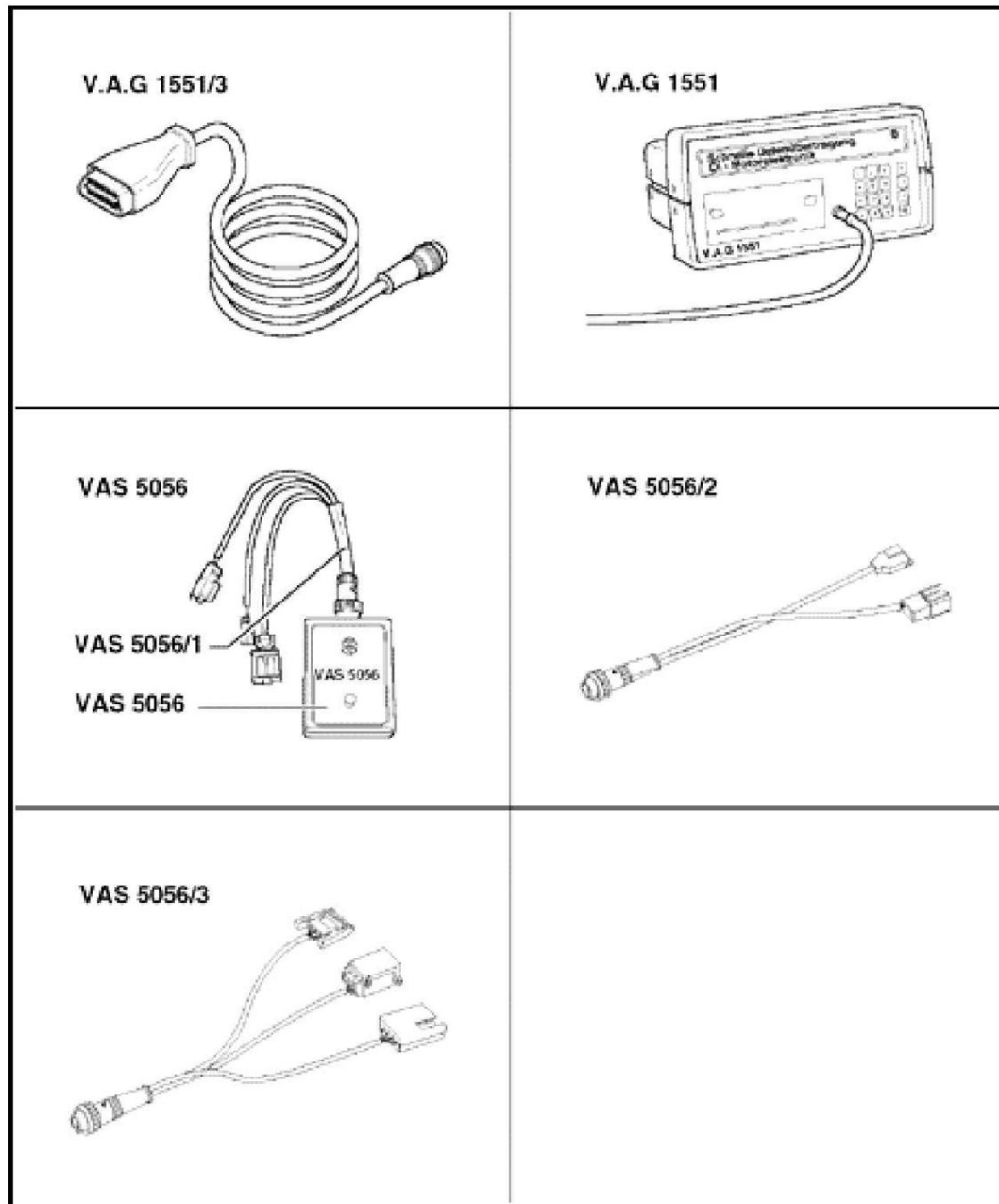


G03258757

Fig. 184: Scan Tool Display - A/C System Signals (2 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -3- buttons to select Function 03: "Output Diagnostic Test Mode".

Display will appear as shown:

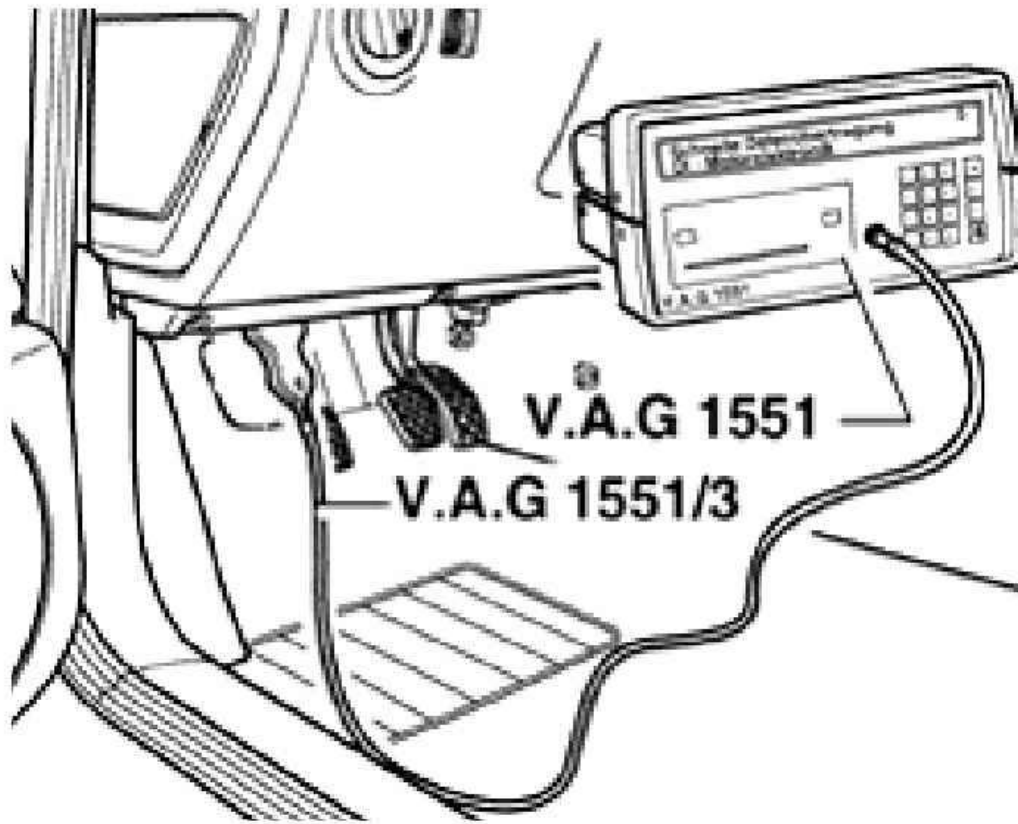


G03258801

Fig. 185: Scan Tool Display - A/C System Signals (3 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -Q- button to enter input.

Display will appear as shown:



G03258802

Fig. 186: Scan Tool Display - A/C System Signals (4 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

V.A.G 1551 -D/7.0- 1.01.1997

G03258803

Fig. 187: Scan Tool Display - A/C System Signals (5 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

V.A.G Self-diagnosis

HELP

1- Rapid data transfer*

2-Flash code output*

G03258804

Fig. 188: Scan Tool Display - A/C System Signals (6 Of 6)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- A/C compressor shut-off is checked via Output DTM.
- The A/C compressor must stop within 5 secs, (visual check) then start approx. every 5 secs. and then stop.

If A/C compressor NOT switched OFF

- Proceed with Function 03: Output DTM, until completed.
- Press -0- and -6- buttons to select Function 06: "End output".
- Press -O- button to enter input.

- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness

Rapid data transfer

HELP

Enter address word XX

G03258805

Fig. 189: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between following Test Box socket and A/C system using Electrical Wiring Diagram.

See appropriate System Wiring Diagram article.

Up to MY 1999

Socket 16

From MY 2000

Socket 29

- Wire resistance: 1.5 ohm maximum

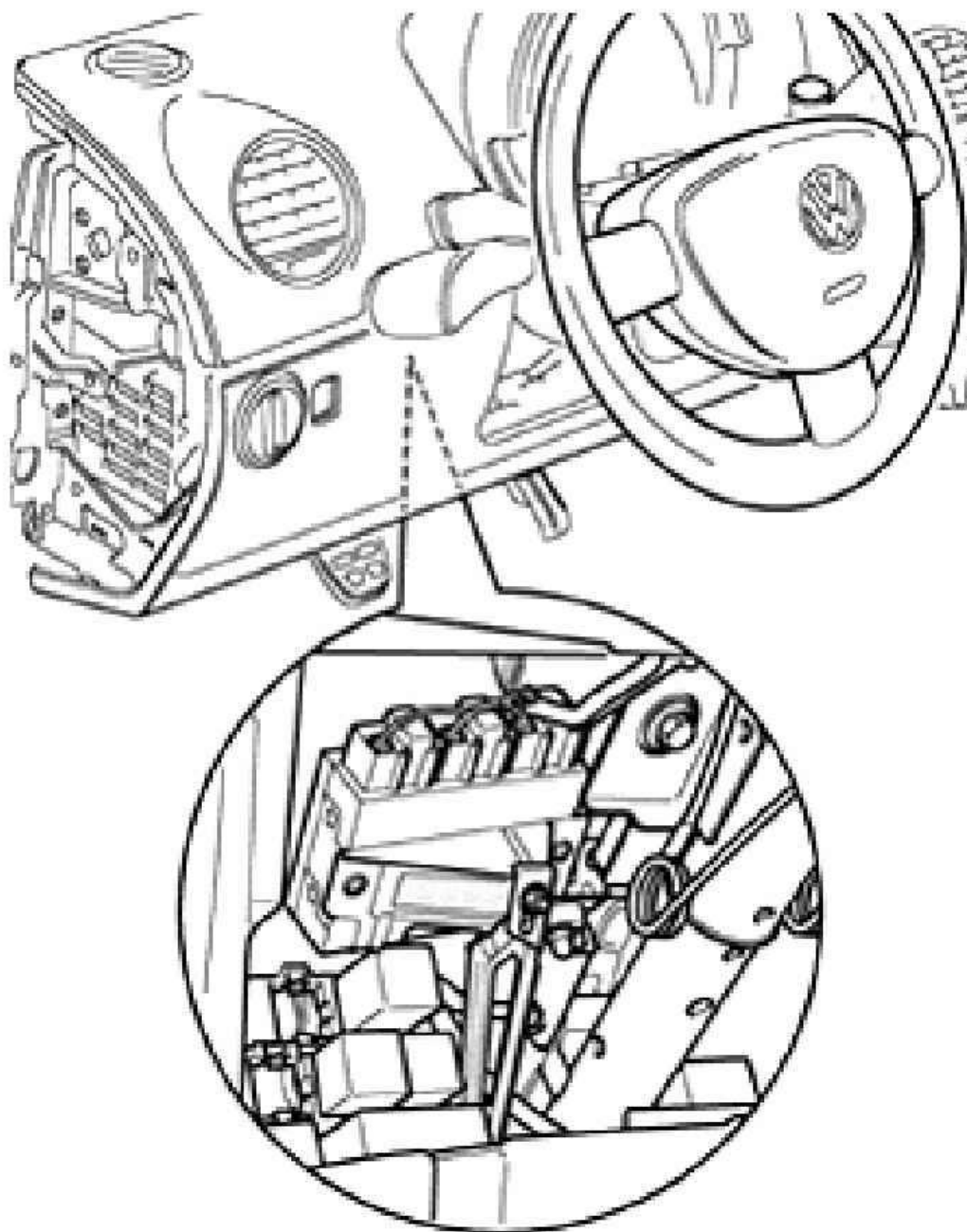
A/C system signal to ECM (engine speed adaptation), checking

The A/C system signal make sure that the Engine Control Module maintains A/C system operation constant regardless of load at idle.

Test sequence

- Connect VAG1551/1552 Scan Tool. See **VAG1551/1552 SCAN TOOL, CONNECTING** .
- Start engine and let idle.
- Press -0- and -1- buttons to select Address word 01: "Engine electronics"

Display will appear as shown (example only):



G03258806

Fig. 190: Scan Tool Display - A/C System Signal To ECM (1 Of 5)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press --> button.

Display will appear as shown:

Rapid data transfer

HELP

Enter address word XX

G03258807

Fig. 191: Scan Tool Display - A/C System Signal To ECM (2 Of 5)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0- and -8- buttons to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Display will appear as shown:

Rapid data transfer

HELP

Enter address word XX

G03258808

Fig. 192: Scan Tool Display - A/C System Signal To ECM (3 Of 5)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -0-, -0- and -2- buttons to select "Display group 2".
- Press -Q- button to enter input.

Display will appear as shown (1 to 4 = Display zones):

Rapid data transfer

Q

46 Comfort System (vehicles with power windows) central module

G03258809

Fig. 193: Scan Tool Display - A/C System Signal To ECM (4 Of 5)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Switch ON A/C by pressing "Auto" button and selecting lowest temperature.
 - A/C compressor must run.
- Observe display in Display zone 3.

If specification not obtained:

- Specified Value: 1 X 1 (A/C system signal)

Rapid data transfer

Tester sends address word 46

G03258810

Fig. 194: Scan Tool Display - A/C System Signal To ECM (5 Of 5)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect VAG1598/22 (or 1598/31) Test Box to ECM wiring harness.

1C0959799F 6M CU Conv HLO 0004 ➡

Coding 00257

WSC 12345

G03258811

Fig. 195: Connecting VAG1598/22 (Or 1598/31) Test Box To ECM Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check wiring for open circuit between following Test Box socket and A/C system using Wiring diagram.

Up to MY 1999

Socket 48

From MY 2000

Socket 34

- Wire resistance: 1.5 ohm maximum

CAN-Bus, checking

NOTE: **The following list refers to Fig. 196 .**

1. **Engine Control Module (ECM)**
2. **ABS control module**
3. **Transmission Control Module (TCM)**
 - Only vehicles with automatic transmission
4. **Airbag control module**
5. **Instrument cluster**
6. **CAN-Bus**

Please wait

G03258812

Fig. 196: Identifying CAN-Bus Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Function

The Engine Control Module (ECM) (item -1-) communicates with the ABS control module (item -2-), the Transmission Control Module (item -3-), the airbag control module (item -4-) and the instrument cluster (item -5-) via a CAN-Bus (item -6-).

Function, continued

At least two control modules capable of CAN - Bus are connected by two wires (CAN-High and CAN-Low, twisted together) and exchange information (messages). Missing information on the CAN-Bus will be recognized as a malfunction by the ECM as well as by other CAN-Bus control modules.

All control modules have 120 W terminal resistors which make sure that the CAN-Bus can function without fault.

Special tools and equipment

- Multimeter (Fluke 83 or equivalent)
- VW 1594 adapter set
- Wiring diagram
- VAG1598/21 Test box

Test conditions

- Malfunction has been recognized by CAN-Bus OBD
- ABS control module coded to CAN-Bus operation

Test sequence

- Connect VAG1598/21 test box -1- to ABS control module wiring harness -2-.

1Y1959801 Door control unit DS KLO 0001 ➡ G03258813

Fig. 197: Connecting VAG1598/21 Test Box To ABS Control Module Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check terminal resistor in Engine Control Module (ECM) by performing resistance measurement between test box sockets 10 + 11.
- Specified value: 115 to 135 W

If the resistance value is outside the specified range:

- Replace Engine Control Module (ECM). See **Engine Control Module (ECM), replacing** .

If the resistance value is within the specified range:

- Check CAN-Bus wiring using wiring diagram.